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Residential Transportation Energy Consumption Survey

Household Vehicles Energy Consumption 1988



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Note: The title for this report, previously *Residential Transportation Energy Consumption Survey: Consumption Patterns of Household Vehicles (data year)* has been changed to *Household Vehicles Energy Consumption 1988*. The survey has been removed from the title.

Cover Caption: *Vehicles traveling back and forth on the freeway illustrate Vehicle Miles Traveled (VMT). VMT was collected during the Residential Transportation Energy Consumption Survey. (Southwest Freeway, Washington, DC.)*



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Household Vehicles Energy Consumption 1988

Energy Information Administration
Office of Energy Markets and End Use
U.S. Department of Energy
Washington, DC 20585

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Contacts

General information concerning the contents of this report may be obtained from Lynda T. Carlson, Director of the Energy End Use Division (202 586-1112). Specific information regarding the contents or preparation of the publication may be obtained from Nancy L. Leach, Chief of the Residential and Commercial Branch (202 586-1114). The RTECS Survey Manager and principal author for this publication is Martha Johnson (202 586-1135). Paul Gargiullo (202 586-1137) can be contacted for information related to the estimation procedures for vehicle fuel consumption and expenditures, fuel efficiencies, and variances including the creation of the row/column factors. Robert Latta (202 586-1385) can be contacted for information related to the sample design. Contact Mark Schipper (202 586-1136) for information about imputation procedures. For information related to vehicle fuel prices, contact Leigh Carleton (202 586-1132). Public use data files and related system design were prepared by Nanno Smith (202 586-5841), Leigh Carleton (202 586-1132), and M. Vicki Moorhead (202 586-1133).

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Executive Summary

Several interrelated changes occurred in the residential transportation sector between 1985 and 1988. Although there was an increase in the number of miles traveled (both per household and per vehicle), the average consumption of motor vehicle fuel decreased. An increase in fuel efficiencies, in miles per gallon (MPG), was the primary reason for the decreased consumption. Vehicle fuel expenditures per household fell by 22 percent between 1985 and 1988, primarily due to a drop in the price of vehicle fuel. These findings are from the 1988 Residential Transportation Energy Consumption Survey (RTECS) conducted by the Energy Information Administration (EIA).

Results from the 1988 RTECS indicate that:

- In 1988, the annual vehicle miles traveled (VMT) per household and per vehicle were 18,595 and 10,246, respectively. In 1985, the VMT per household was 17,402 and the VMT per vehicle was 9,855.
- The average number of vehicles per household did not change between the 1983 and the 1985 RTECS; both surveys reported 1.8 vehicles per household.
- Average fuel consumption per vehicle and per household was less in 1988 than in 1985. Per vehicle fuel consumption was 559 gallons in 1988, down from 611 gallons in 1985. Per household vehicle fuel consumption was 1,014 gallons in 1988 and 1,079 gallons in 1985.
- In 1988, the average on-road vehicle MPG was 18.3 MPG. In 1985, the average was 16.1 MPG.¹
- In 1988, there were 4.7 million more pickup trucks in the residential sector than in 1985 (25.9 million and 21.2 million, respectively). In 1988, pickup trucks comprised 18 percent of residential vehicles, up from 15 percent in 1985.
- Approximately 13 percent of the vehicle stock consisted of vehicles that were pre-1975 models.
- In 1988, households spent an average of \$998 for vehicle fuel compared to \$1,274 per household in 1985.
- Vehicle fuel expenditures were less than home fuel expenditures. In 1988, combined household energy expenditures were \$2,115. Approximately 47 percent of this total was used for vehicle fuel. This is the reverse of 1985 when vehicle fuel expenditures were 53 percent of the total energy expenditures.

This report is based on data from the 1988 RTECS. The 1988 RTECS provides baseline information on motor vehicle use in the residential sector. To be included in this survey, vehicles must be owned or used by the household on a regular basis for personal transportation. Company vehicles that are not owned by the household, but are kept at home and are regularly available to household members are also included. Data from the RTECS and a companion survey, the Residential Energy Consumption Survey, are available to the public in published reports and on public use tapes.²

¹The methodologies for calculating fuel efficiency, fuel consumption, and fuel expenditures were different in the 1988 RTECS. See Appendix B, "Estimation Methodologies" and Appendix C, "Quality of the Data" for a discussion of these changes.

²See Appendix G, "Related EIA Publications on Energy Consumption" for a list of EIA publications available concerning the consumption of energy.

Table ES1 summarizes selected vehicle energy-related items from the 1988 RTECS. This table allows the reader to discern quickly energy information related to vehicle characteristics.

Table ES1. Summary of Vehicle Characteristics by Census Region, 1988

	U.S. Total	Census Region			
		Northeast	Midwest	South	West
Number of Households with Vehicles (million)	81.3	15.2	20.4	28.3	17.3
Number of Vehicles (million)	147.5	26.6	37.8	50.6	32.5
Number of Vehicles per Household	1.8	1.7	1.8	1.8	1.9
Vehicle Miles Traveled (billion)	1,511	274	379	534	325
Vehicle Miles Traveled per Household	18,595	17,997	18,518	18,859	18,783
Vehicle Miles Traveled per Vehicle	10,246	10,311	10,021	10,550	9,980
Vehicle Fuel Consumption (billion gallons)	82.4	14.0	20.8	29.6	18.1
Vehicle Fuel Efficiency (miles per gallon)	18.3	19.6	18.2	18.0	18.0
Vehicle Fuel Expenditures (billion dollars)	81.1	14.2	20.4	29.1	17.5

Note: Because of rounding, data may not sum to totals.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Introduction

Household Vehicles Energy Consumption 1988 is the primary publication from the 1988 Residential Transportation Energy Consumption Survey (RTECS). It is prepared by the Energy End Use Division of the Office of Energy Markets and End Use, Energy Information Administration (EIA). The EIA collects and publishes comprehensive data on energy consumption in the residential transportation sector through the RTECS.

Background

The data for this report are based on the household telephone interviews from the 1988 RTECS, conducted during 1988. The 1988 RTECS represents 91.6 million households and 147.5 million household motor vehicles in the 50 States and the District of Columbia.

The RTECS is a national multistage probability sample survey currently conducted on a triennial basis. The 1988 RTECS was the third RTECS covering a calendar year. Previous RTECS were conducted monthly from June 1979 to September 1981 and then annually in 1983 and 1985. The next RTECS is scheduled in 1991. The RTECS, a subsample of the Residential Energy Consumption Survey (RECS), is an integral part of a series of surveys designed by the EIA to collect data on energy use in the residential sector. The EIA also conducts energy consumption surveys in the commercial and manufacturing sectors. See Appendix G, "Related EIA Publications on Energy Consumption" for a listing of publications from the RTECS and other EIA surveys in the residential, commercial and manufacturing sectors.

Baseline information about the RTECS household and vehicle stock was collected during the RECS personal interview in the fall of 1987. In 1988, further data about the vehicle stock and the vehicle miles traveled (VMT) were collected via telephone interviews. Mail questionnaires were used for households that could not be contacted by telephone. Data were collected three times during the calendar year. The first data collection was in January 1988. The second data collection occurred in May and June 1988 and the final data collection was during January and February 1989.

The RTECS was designed to collect actual VMT for each vehicle in the household by obtaining the odometer reading at two points in time. Vehicle characteristic information for each vehicle was collected directly from the respondent and also from the decoded Vehicle Identification Number (VIN). Vehicle fuel efficiencies, presented in miles per gallon (MPG), vehicle fuel consumption and expenditures were estimated, in contrast to previous RTECS where the efficiencies were calculated from the survey data. (See Appendix B, "Estimation Methodologies" for detailed information about the procedures used to estimate the MPG and the consumption and expenditures.)

This report is primarily a descriptive profile of personal vehicle transportation in 1988 in the residential sector. Included are data about: the number and type of vehicles in the residential sector, the characteristics of those vehicles, the total annual VMT, the per household and per vehicle VMT, the vehicle fuel consumption and expenditures, and vehicle fuel efficiencies.

The data presented in this report provide objective and timely energy information for a wide audience including Congress, Federal and State agencies, industry, and the general public. These data were collected and published by the EIA to fulfill its responsibilities as specified in the Federal Energy Administration Act of 1974 (Public Law 93-275), as amended.

The statistics published in this report are based on a sample from the population of all residential housing units in the United States as of November 1987. As a result, all the values are estimates rather than exact measures for the population. As described in Appendix C, "Quality of the Data," the accuracy of each estimate is indicated by its relative standard error (RSE). In general, no estimates were published that were based on fewer than 10 sample households or had an RSE greater than 50 percent. Tables of estimates in the section titled "Detailed Statistics" include row and column RSE factors that are shaded on each table to help calculate corresponding RSE's. All comparisons reported in the text were made at the 0.05 level of statistical significance. No adjustments were made for simultaneous inference.

The EIA gratefully acknowledges the cooperation of the respondents in supplying the information used to produce the estimates in this report.

Organization of the Report

A detailed discussion of the highlights presented in the Executive Summary follows this section. Tables and figures interspersed throughout the text highlight information of special interest or summarize a finer breakdown given in the detailed tables. The detailed tables that appear in the "Detailed Statistics" section following the main text contains extensive crosstabulations of household characteristics, vehicle characteristics, and vehicle fuel consumption and expenditures. Ap-

pendices A through C contain information about how the survey was conducted, the estimation procedures and the quality of the data. Information about the VIN is located in Appendix A, "How the Survey Was Conducted" and procedures for calculating the RSE's are located in Appendix C, "Quality of the Data."

The data for the RTECS are collected on Forms EIA-457B and EIA-876A through C found in Appendix D, "Survey Forms." Climate zone and Census Regions and Divisions maps are located in Appendices E and F, respectively. A list of related EIA publications on energy consumption is found in Appendix G. Definition of the terms used in this report are located in the "Glossary."

Change in Survey Design

Two major changes in the survey design and the data collection procedures occurred with the 1988 RTECS:

- 1) For the first time since the beginning of the RTECS, actual on-road vehicle fuel efficiencies and fuel prices were not collected via fuel purchase diaries.
- 2) Respondents were asked to provide the VIN for each vehicle.

In previous RTECS, the on-road vehicle fuel efficiencies and vehicle fuel prices were obtained by asking the respondents to maintain fuel purchase diaries for a 1-month period. The respondents were randomly assigned to a 1-month panel covering a calendar year. Fuel efficiencies in terms of MPG were then calculated directly using the monthly recorded vehicle fuel consumption and the recorded monthly VMT. In the 1988 RTECS, the MPG were estimated using the Environmental Protection Agency (EPA) certification files of test laboratory MPG estimates adjusted for on-road use. The vehicle fuel price was estimated using the Bureau of Labor Statistics (BLS) price data. The VIN was used to enhance the accuracy of vehicle characteristics that were used for matching the RTECS vehicles to the EPA certification files. (See Appendix A, "How the Survey was Conducted" for a detailed discussion of the changes in the survey design and Appendix B, "Estimation Methodologies" for a discussion of the procedures used for calculating the fuel efficiencies, adjusting the MPG for on-road efficiency shortfall, and the motor fuel consumption and expenditures data.)

Vehicle Stock

Average Number of Vehicles per Household Did Not Increase Between 1985 and 1988

The 1988 RTECS indicates that although the total number of motor vehicles increased since 1985, the average number of vehicles per household did not increase at a statistically significant level. For the RTECS, motor vehicles are defined as automobiles, station wagons, passenger and cargo vans, motor homes, pickup trucks and jeeps or similar vehicles that are either owned by members of a household or used on a regular basis for personal transportation. Also included are company cars,

Size of Vehicle Stock as of July 1988

At the midpoint of the RTECS (July 1988), approximately 34 percent of the households owned or used only one vehicle and approximately 37 percent of the households owned or used two vehicles on a regular basis. Approximately 16 percent owned three or more vehicles, while about 13 percent of the households did not own or use a vehicle on a regular basis (Figure 1). The proportion of households without vehicles was highest in the Northeast Census Region (22 percent) and lowest in the West Census Region (9 percent). Approximately 11 percent and 12 percent of the households in the Midwest and South

Measurement of Vehicle Stock

The size of the vehicle stock can be measured in two ways. First, the total number of vehicles in a household can be enumerated at **one point in time**. For example, a household could report the presence of three vehicles as of a specific date (for this report, July 1988). Second, the average number of vehicles in a household can be measured **over a period of time** (for this report, calendar year 1988). For example, if a household owned or used regularly two vehicles for the entire year and one vehicle for one-half of the year, the average number of vehicles for the household would be 2.5.

For this report, with the exception of the following discussion, "Size of Vehicle Stock as of July 1988," all statistics such as vehicle miles traveled, vehicle fuel consumption, and vehicle expenditures are based on the households' vehicle use throughout the 1988 calendar year, rather than at one referenced point in time.

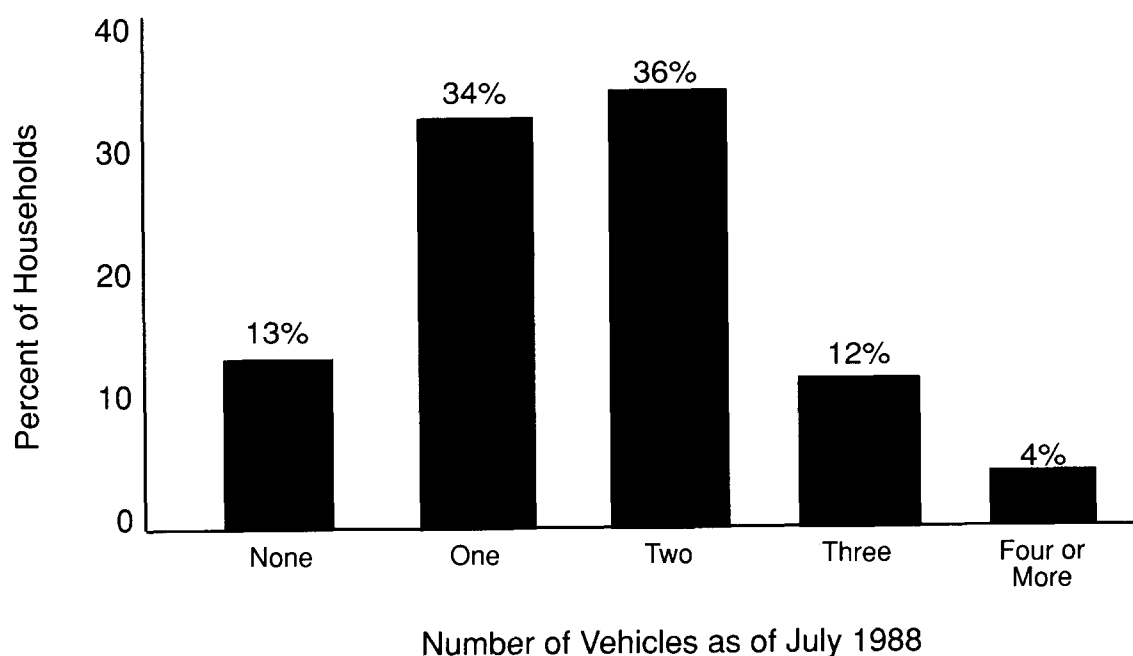
not owned by the household but available regularly to the household members for their personal use and vehicles that are rented or leased for one month or more.

During 1988, 147.5 million motor vehicles were owned or used regularly for personal transportation in the United States. This is an increase of 10.2 million vehicles (7 percent) over the 1985 RTECS. The average number of vehicles per household remained at 1.8 in both the 1985 and 1988 surveys. These vehicles were owned or used on a regular basis at some period of time in 1988 by 81.3 million households or approximately 89 percent of the 91.6 million RTECS households.

Census Regions, respectively, did not own or use a motor vehicle on a regular basis.

The number of vehicles in the household at the midpoint of the RTECS varied substantially by the level of family income. In July 1988, 40 percent of the 16.4 million households with annual family incomes of less than \$10,000 did not own a vehicle and 43 percent owned only one vehicle. In contrast, the proportion of households without vehicles or with only one vehicle was 2 percent and 15 percent, respectively, for the 13.6 million families with incomes of \$50,000 or more. Among this higher income group, 35 percent of the families reported owning or using three or more vehicles on a regular basis (Table 1).

Figure 1. Percent of Households by Number of Vehicles Used for Personal Use, 1988



Note: Because of rounding, data may not sum to totals.
Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Table 1. Number of Vehicles by 1987 Family Income, as of July 1988
(Million Households)

	Total Households (million)	Number of Vehicles			
		None	One	Two	Three or More
Total Households	91.6	12.0	31.2	33.4	15.0
1987 Annual Family Income					
Less than \$10,000	16.4	6.5	7.0	2.4	.5
\$10,000 to \$19,999	22.4	3.2	10.7	6.4	2.1
\$20,000 to \$34,999	25.9	1.7	9.0	11.2	4.0
\$35,000 to \$49,999	13.2	.3	2.4	6.9	3.6
\$50,000 or More	13.6	.3	2.1	6.6	4.7

Note: •Family income is based on the 1987 annual income that is collected in the 1987 Residential Energy Consumption Survey, of which the RTECS is a subsample. •Because of rounding, data may not sum to totals.
Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Average Number of Vehicles

The average number of vehicles in a household was determined by the number of vehicles a household owned or used on a regular basis over a period of time rather than at one referenced point in time. In the RTECS, the average number of vehicles was the effective number of vehicles in a household's possession for a full year. For example, if a household owned two vehicles, one each for one-half of a year, that household would effectively possess an average of one vehicle for the entire year. If a household owned two vehicles, one for the full year and one for 6 months, that household would effectively possess an average of 1.5 vehicles. The "Detailed Statistics" section presents the average number of vehicles by selected household and vehicle characteristics. (See "Glossary" for the definition of Vehicle and Vehicle Stock.)

On average, in 1988, households owned or used 1.8 vehicles per household on a regular basis. There was no statistically significant change in the average number of vehicles between 1985 and 1988.

There was a relationship between the average number of vehicles per household and annual family income,³ number of drivers and the composition of the household.

1987 Family Income: As family income increased, the average number of vehicles in the household increased. Households with annual family incomes of less than \$10,000 had an average of 1.3 vehicles per household compared to an average of 2.4 vehicles found in households with annual family incomes of \$75,000 or more. In households with family incomes of \$35,000 or more, the average number of vehicles was 2.3, while households with incomes under \$35,000 had an average of 1.6 vehicles per household.

Number of Drivers: As expected, the more drivers of vehicles in the household, the greater the aver-

age number of vehicles in the household. Households with only two drivers averaged 1.9 vehicles per household, while households with four or more drivers averaged 3.2 vehicles per household. Approximately 5 percent (4.2 million) of the households had 4 or more drivers.

Household Composition: A greater number of vehicles per household was found in households where the oldest child was aged 16 or 17 years old and in two-adult households without children, where the householder was between age 35 and 59 years old (2.4 and 2.3 vehicles per household, respectively). Households with the oldest child less than 7 years old or between 7 and 15 years old had an average of 1.8 and 1.9 vehicles, respectively. Older householders living alone had the least number of vehicles.

Change in Vehicle Stock

The average number of vehicles in the household is related to the number of different vehicles a household acquires or disposes of throughout the year. Among the 81.3 million households that owned or used vehicles, approximately 41 percent of the households made some type of change in their vehicle stock during 1988. Of these 33.6 million households that made a change, 19 percent only acquired one or more vehicles, 30 percent only disposed of one or more vehicles and another 35 percent both acquired and disposed of exactly one vehicle. Other changes, such as acquiring and disposing of more than one vehicle, were made by 16 percent of the households. Households most likely to make a change were those households with a greater number of household members (Tables 2 and 18).

Among the 58.0 million households that did not change their vehicle stock in 1988, 18 percent of the households had no vehicles, 38 percent had one vehicle and 44 percent had two or more vehicles.

³Annual family income is from the 1987 RECS, of which the RTECS is a subset.

Table 2. Change in Vehicle Stock by Selected Household Characteristics, 1988

	Households not Changing Vehicles		Households Changing Vehicles	
	(million)	(percent)	(million)	(percent)
Total Households	58.0	100	33.6	100
Households Composition				
Households with Children	17.6	30.3	15.3	45.5
Households Without Children	40.4	69.7	18.3	54.5
Household Size				
One	17.8	30.7	4.4	13.1
Two	20.6	35.5	10.3	30.7
Three	8.0	13.8	7.3	21.7
Four	7.0	12.1	6.5	19.3
Five or More	4.6	7.9	5.1	15.2

Note: Because of rounding, data may not sum to totals.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Vehicle Composition

Pickup Trucks -- Second Most Prevalent Vehicle Type in 1988

Vehicle Type

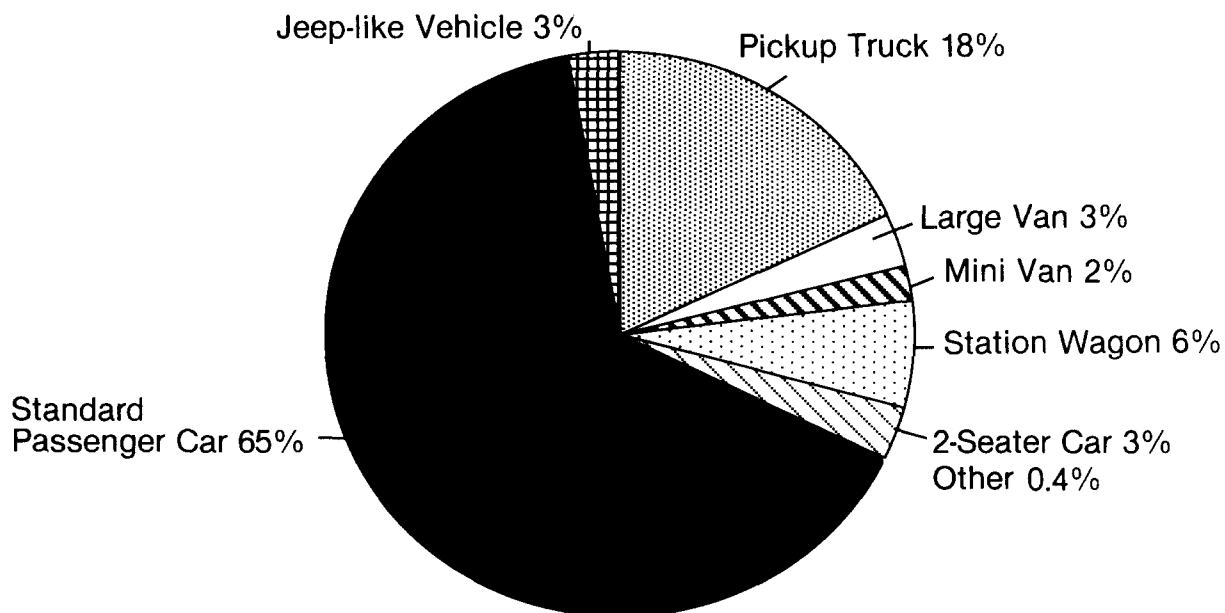
The number of pickup trucks increased by 22 percent between the 1985 RTECS and the 1988 RTECS. They were the second most prevalent type of vehicle, comprising about one-sixth (18 percent) of the vehicle stock. In 1985, pickup trucks comprised 15 percent of the vehicle stock. In 1988, RTECS respondents reported owning or using 25.9 million pickup trucks on a regular basis. This estimate of the number of pickup trucks represents 4.7 million more trucks in the stock in 1988 over 1985.

Passenger cars, including station wagons and small two-seater cars were still the most prevalent type

of vehicle in 1988. Approximately three-fourths of the 147.5 million vehicles owned or used in the residential sector on a regular basis were in this category. Although the passenger car was still the most popular type of motor vehicle, the number of them in the vehicle stock did not increase at a statistically significant level since the 1985 RTECS.

Vans comprised only 5 percent of the vehicle stock in 1988; however, there was a 47 percent increase between 1985 and 1988 in the number of vans owned or used regularly. In 1985, there were 4.7 million vans. This number increased to 6.9 million in 1988. Although there was also an increase in the number of jeep-like vehicles, the increase was not statistically significant (Figure 2).

Figure 2. Vehicle Stock Composition, 1988



Total Number of Vehicles = 147.5 million

Note: Because of rounding, data may not sum to totals.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Vehicle Model Year

In 1988, approximately 5 percent of the stock was comprised of 1988 and 1989 models. Another 42 percent of the vehicles were model years 1983 through 1987, and 40 percent were model years 1975 through 1982. The remaining 13 percent of

the vehicle stock consisted of pre-1975 models. The West Census Region had the greatest proportion of pre-1975 vehicles. Approximately 21 percent of the 32.5 million vehicles that were in the West were pre-1975 models. In contrast, only 8 percent of the 26.6 million vehicles in the Northeast Census Region were pre-1975 vintage (Table 3).

Table 3. Vehicles by Model Year and Census Region, 1988

	U.S. Total	Census Region			
		Northeast	Midwest	South	West
Total Vehicles					
(million)	147.5	26.6	37.8	50.6	32.5
Vehicle Model Year					
(percent)					
1989 to 1986	23	28	22	24	20
1985 to 1981	35	40	35	34	30
1980 to 1975	29	24	32	29	29
1974 or Earlier	13	8	11	12	21

Note: Because of rounding, data may not sum to totals.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Vehicle Miles Traveled

Households Traveled More In 1988

Total Vehicle Miles Traveled

Total vehicle miles traveled (VMT) for all vehicles increased by approximately 3.8 percent annually between the 1985 RTECS and the 1988 RTECS. In 1988, vehicles traveled a total of 1,511 billion miles compared to 1,353 billion miles in 1985. Since 1983, total VMT has climbed from 1,215 billion miles in 1983 to 1,353 billion in 1985 and 1,511 billion in 1988.

A change in total VMT can be attributed to either a change in the number of households with vehicles, a change in the number of vehicles per

household, a change in the usage of the vehicles, or a combination of factors. Between the 1983 and the 1985 RTECS, most of the increase in total VMT was due to an increase in the number of households owning or using vehicles. During that period the number of households with vehicles increased by 3.7 percent annually while the VMT per household only increased by 1.7 percent annually.

Between the 1985 and the 1988 RTECS, the combination of an increase in the number of households with vehicles and a greater usage of the vehicles contributed to the increase in total VMT. Greater vehicle usage played the larger part in the VMT increase since the number of households with vehicles increased by approximately 1.5 percent annually, while the VMT per household increased by 2.2 percent annually.

Measurement of Vehicle Miles Traveled (VMT)

In the RTECS, annual VMT for a vehicle were either calculated using two odometer readings or imputed using a regression estimate. For a sample vehicle, beginning-of-year and end-of-year odometer readings were collected. If two odometer readings were available, the difference between the two readings (adjusted to reflect a 366-day year, since 1988 was a leap year) equaled the VMT. For vehicles that were in the household for a period of time that was less than 1 year, the mileage was adjusted to reflect the amount of time the household was in possession of the vehicle. For vehicles with less than two odometer readings, a regression estimate was used to estimate the annual mileage. If the vehicle was in the possession of the household for the entire year, the annual VMT was estimated by the regression estimate. If the vehicle was in the possession of the household for less than the full year, the regression estimate was adjusted downward to reflect the amount of time the vehicle was in the possession of the household. The total VMT (the number of miles traveled nationally for all residential vehicles) equals the weighted sum of the individual VMT for each vehicle. (See Appendix B, "Estimation Methodologies" and Appendix C, "Quality of the Data" for further discussion about the annual VMT.)

In the longer time period between 1983 and 1988, the increase in the number of households with vehicles played a larger role in total VMT increase. However, this trend may be changing be-

cause the increase in households with vehicles has slowed from an annual increase of 3.7 percent between 1983 and 1985 to 1.5 percent between 1985 and 1988 (Table 4).

Table 4. Annual Percent Change in Vehicle Miles Traveled, 1983, 1985, and 1988

	Survey Year			Annual Percent Change		
	1983	1985	1988	1983 to 1985	1985 to 1988	1983 to 1988
Number of Households (million)	84.4	87.3	91.6	1.7	1.6	1.7
Number of Households with Vehicles (million)	72.2	77.7	81.3	3.7	1.5	2.4
Number of Vehicles (million)	129.3	137.3	147.5	3.0	2.4	2.7
Vehicle Miles Traveled (billion)	1,215	1,353	1,511	5.5	3.8	4.5
Vehicle Miles Traveled per Household with Vehicles	16,830	17,402	18,595	1.7	2.2	2.0
Vehicle Miles Traveled per Vehicle	9,399	9,855	10,246	2.4	1.3	1.7

Source: Energy Information Administration, Office of Energy Markets and End Use, 1983, 1985, and 1988 Residential Transportation Energy Consumption Surveys.



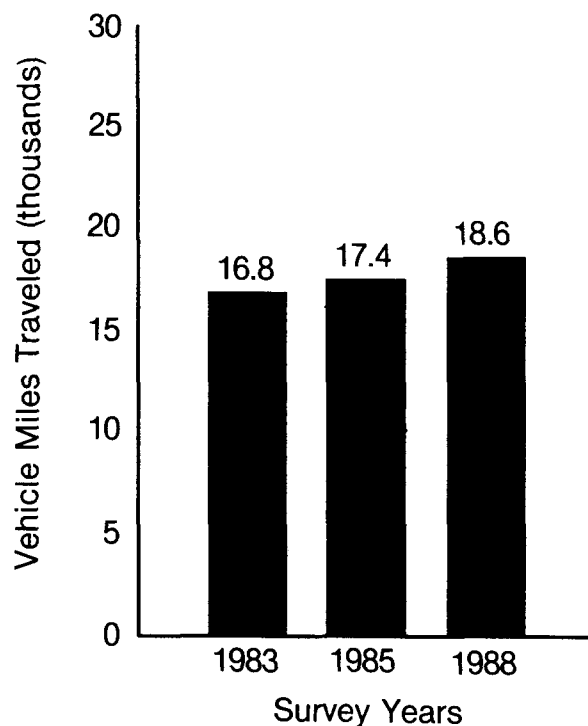
Data on vehicle type in the household were collected in the RTECS. Vans were among the different types of vehicles.

Average Vehicle Miles Traveled

In 1988, an average of 10,246 miles were driven per vehicle, and an average of 18,595 miles were driven per household (Figure 3).

The average VMT in 1988 varied by household composition, family income, vehicle type, and model year, and by size of vehicle (measured by engine size). More VMT per household were reported by households with children (particularly if the oldest child was age 16 or 17 years old) and by households in the higher income brackets. More VMT per vehicle were reported by households with mini vans, newer vehicles and vehicles with smaller engine sizes.

Figure 3. Average Vehicle Miles Traveled per Household, 1983, 1985, and 1988



Source: Energy Information Administration, Office of Energy Markets and End Use, 1983, 1985, and 1988 Residential Transportation Energy Consumption Surveys.

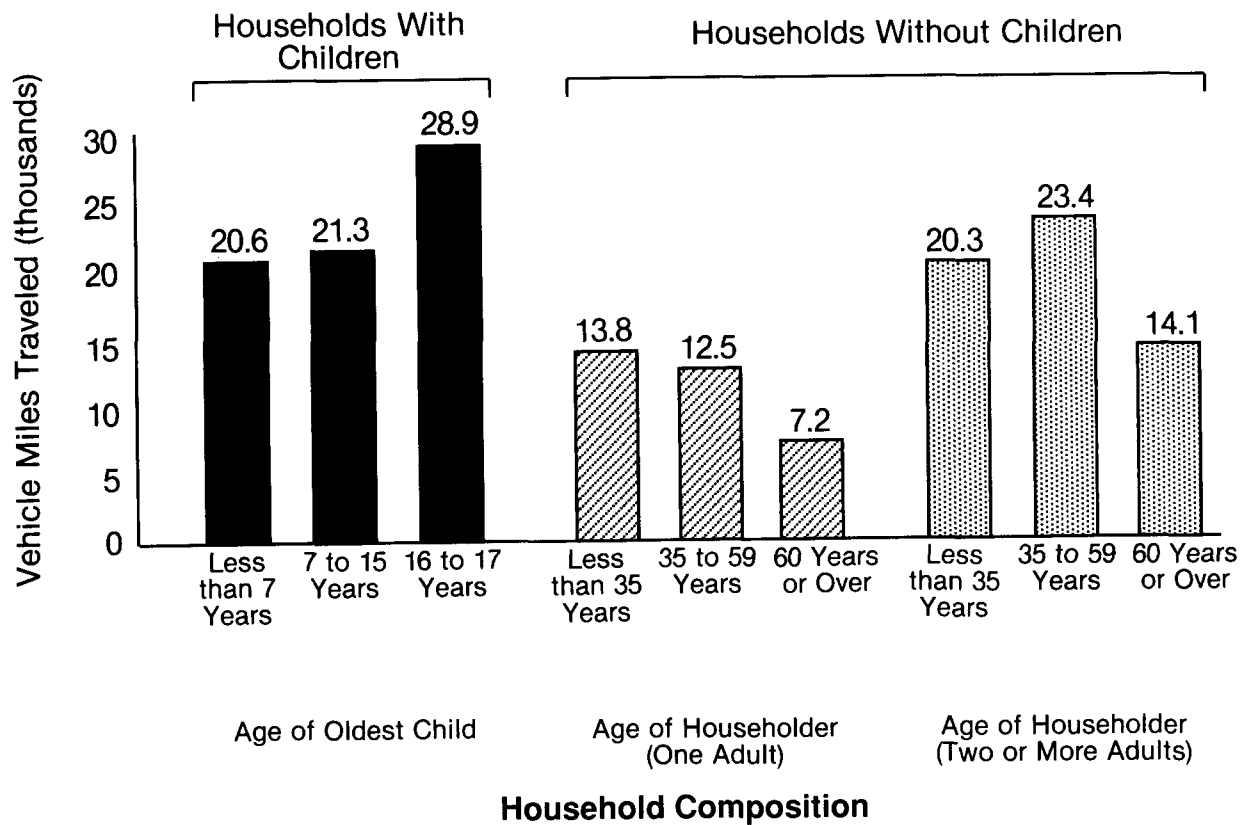


Data on average vehicle miles traveled were collected in the RTECS.

Household Composition: Households with children age 16 and 17 years old drove an average of 12,547 more miles per household than did households without children. These households also drove between an average of 7,553 and 8,242

more miles per household than households with younger children. Households comprised of only one adult who was age 60 years or over had the lowest VMT. These households drove an average of 7,229 miles per household (Figure 4).

Figure 4. Average Vehicle Miles Traveled per Household by Household Composition, 1988

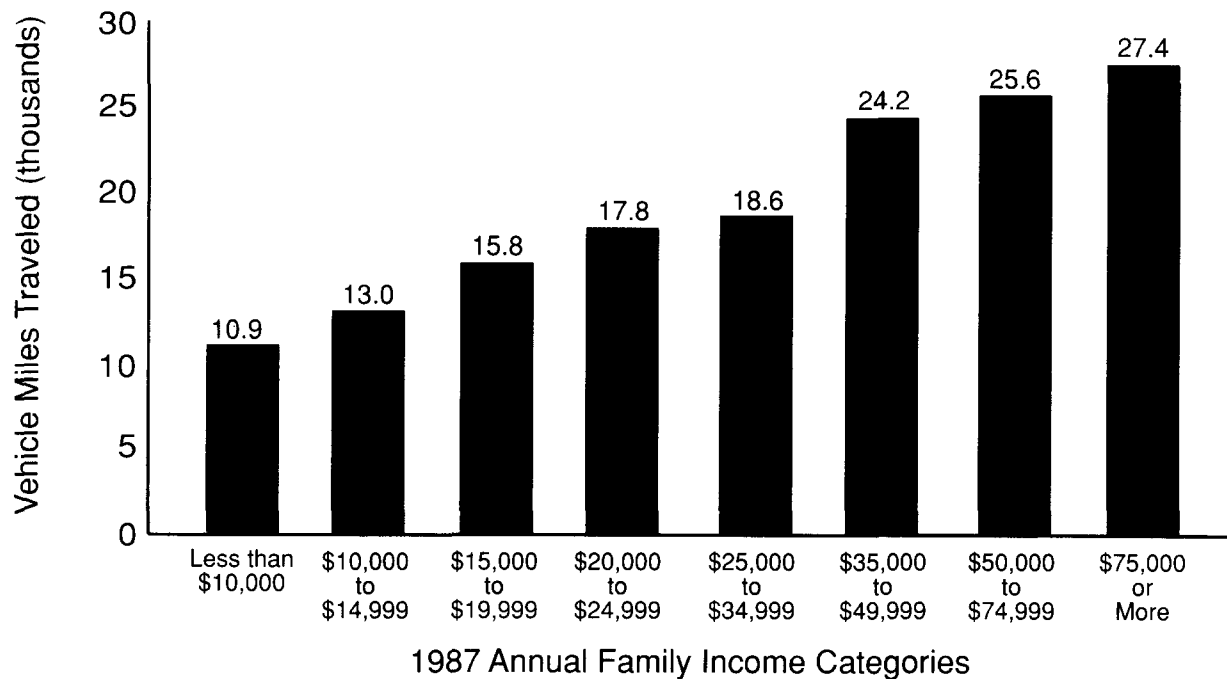


Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Family Income: Households with annual family incomes of \$35,000 or more (as collected in the 1987 RECS) drove about twice the number of

miles per household than families with incomes less than \$15,000 (Figure 5).

Figure 5. Average Vehicle Miles Traveled per Household by Family Income, 1988



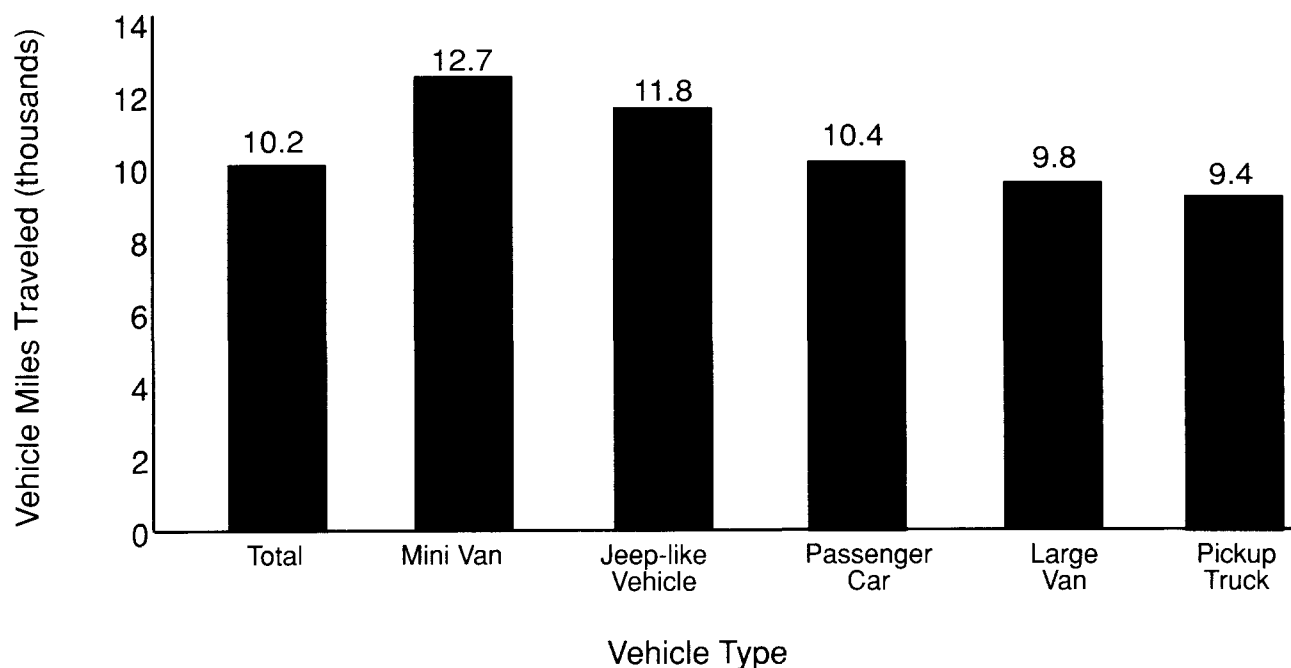
Note: Family income is based on the 1987 annual income that is collected in the 1987 Residential Energy Consumption Survey of which the Residential Transportation Energy Consumption Survey is a subsample.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Vehicle Type: The average VMT per vehicle was greatest for mini vans (12,650) and jeep-like vehicles (11,843), followed by passenger cars (10,372), large vans (9,774), and pickup trucks (9,433). However, only the differences in VMT

between (1) mini vans and large vans or pickup trucks, and (2) jeep-like vehicles and large vans or pickup trucks were statistically significant (Figure 6).

Figure 6. Average Miles Traveled per Vehicle by Vehicle Type, 1988

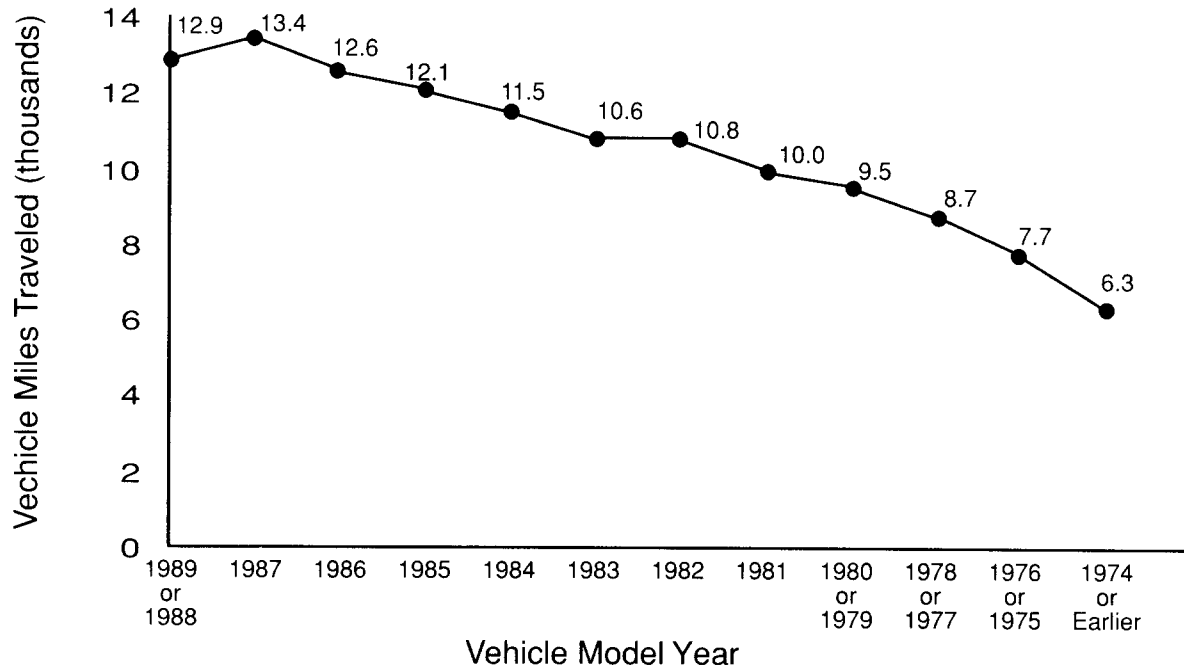


Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Model Year: Average VMT per vehicle also varied by model year. Newer vehicles, (model years 1985

through 1989) were driven twice the number of miles per vehicle than pre-1975 models (Figure 7).

Figure 7. Average Miles Traveled per Vehicle by Model Year, 1988

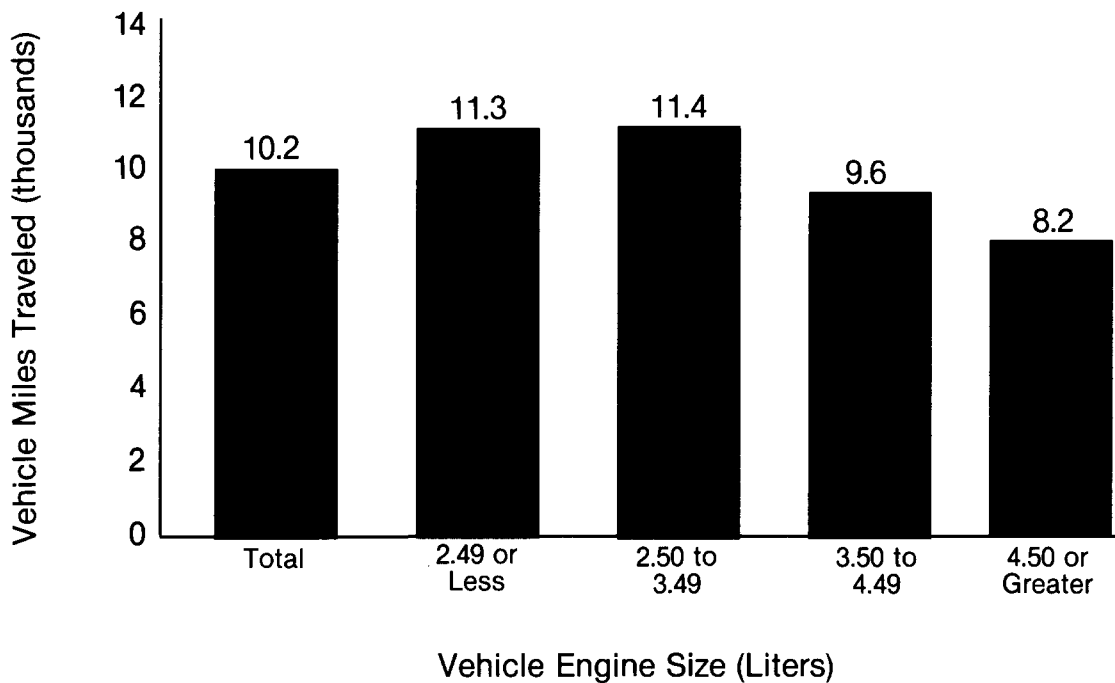


Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Engine Size: In 1988, information about the vehicle engine size (in liters) was collected via the respondents' answers to the RTECS questionnaire and the decoded VIN. Vehicles with smaller engine sizes (less than 2.5 liters) traveled approx-

imately 11,303 miles per vehicle, while vehicles with larger engine sizes (4.5 or more liters) traveled approximately 8,196 miles per vehicle (Figure 8).

Figure 8. Average Miles Traveled per Vehicle by Engine Size, 1988



Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Vehicle Fuel Efficiency Increases, While Average Fuel Consumption and Expenditures Decrease

Measurement of Vehicle Fuel Efficiency

The 1988 RTECS methodology for calculating vehicle fuel efficiency changed from previous RTECS. For the first time, the RTECS did not use vehicle fuel diaries to calculate the miles per gallon (MPG). Instead, MPG were calculated using the Environmental Protection Agency (EPA) laboratory test results adjusted for on-road driving. The vehicle characteristics, obtained from both the Vehicle Identification Number (VIN), collected for the first time in the 1988 RTECS, and from the respondent, were used to enhance the matching of vehicles to the EPA certification files. Because of this change in methodology, the reader should use caution when comparing the 1988 RTECS MPG with MPG in previous RTECS publications. (See Appendices A, "How the Survey was Conducted" and B, "Estimation Methodologies" for a discussion about the VIN, and the calculation of the 1988 RTECS vehicle fuel efficiencies.)

Vehicle Fuel Efficiency

In 1988, the overall average vehicle fuel efficiency was 18.3 MPG. This is an increase of 14 percent over the previous estimate of 16.1 MPG obtained in the 1985 RTECS. Fuel efficiencies differed by vehicle characteristics such as the type, age, and engine size of the vehicle, and the type of vehicle fuel used.

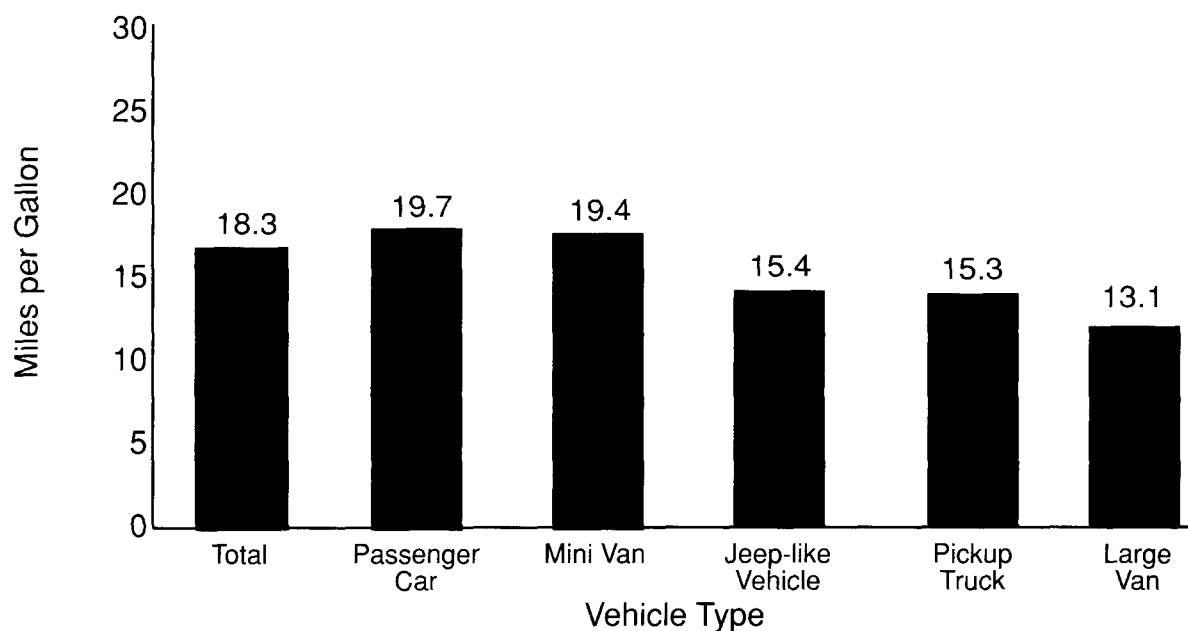
Type of Vehicle: In 1988, passenger cars and mini vans had the highest fuel efficiency with an average of 19.7 MPG and 19.4 MPG, respectively. These vehicles were followed by jeep-like vehicles (15.4 MPG) and pickup trucks, the second most prevalent vehicle in the 1988 stock (15.3 MPG).

Large vans had the lowest MPG with an average of 13.1 MPG (Figure 9).

Model Year: Fuel efficiencies were higher for newer vehicles. These vehicles averaged 22.1 MPG for model years 1988 or 1989 and 22.9 for model years 1987. Fuel efficiency decreased to 16.6 MPG for model years 1979 or 1980 and to 11.9 MPG for the pre-1975 models (13 percent of the stock were pre-1975 models).

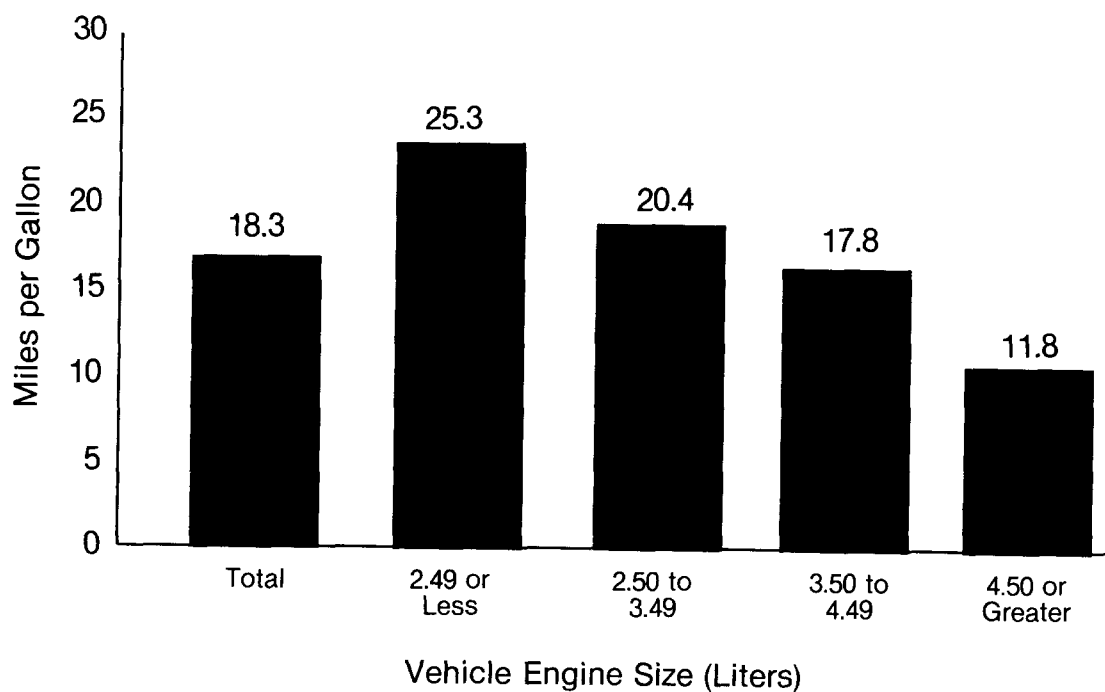
Engine Size: Larger vehicles, as measured by engine size and number of cylinders, had lower fuel efficiencies than the smaller vehicles. Average MPG ranged from a high of 25.3 MPG for engine sizes of 2.49 liters or less to a low of 11.8 MPG for vehicles with engine sizes of 4.5 liters or more (Figure 10).

Figure 9. Fuel Efficiency by Vehicle Type, 1988



Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Figure 10. Fuel Efficiency by Engine Size, 1988



Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

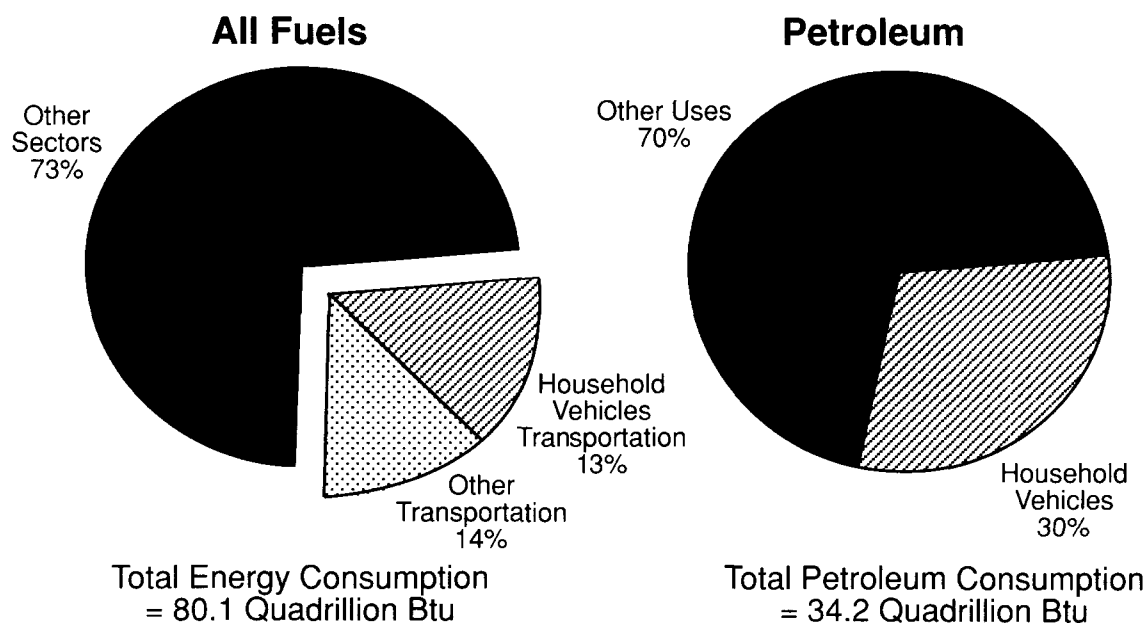
Type of Fuel: The average MPG for vehicles using unleaded gasoline was 19.1 compared to 13.1 MPG for vehicles using leaded gasoline. The 2.1 million vehicles using diesel fuel had the highest fuel efficiencies with an average of 21.5 MPG. (The difference in fuel efficiency between vehicles using diesel fuel and unleaded gasoline was not statistically significant.)

This accounted for approximately 13 percent of the total energy consumption in the United States and approximately 30 percent of all petroleum consumption. Vehicles owned or used regularly in the residential sector accounted for slightly less than one-half of the 21.9 quadrillion Btu of vehicle fuel used in the transportation sector⁴ (Figure 11).

Vehicle Fuel Consumption

In 1988, household vehicles consumed 10.3 quadrillion Btu (82.4 billion gallons) of vehicle fuel.

Figure 11. Total U.S. Energy Consumption, 1988



Note: Total energy consumption in the transportation sector is 21.9 quadrillion Btu (quads); "Household Vehicles Transportation" consumes 10.3 quads; the remainder is "Other Transportation," which consumes 11.6 quads.

Sources: Energy Information Administration, Office of Energy Markets and End Use, *Monthly Energy Review*, June 1989, DOE/EIA-0035(89/06) and 1988 Residential Transportation Energy Consumption Survey.

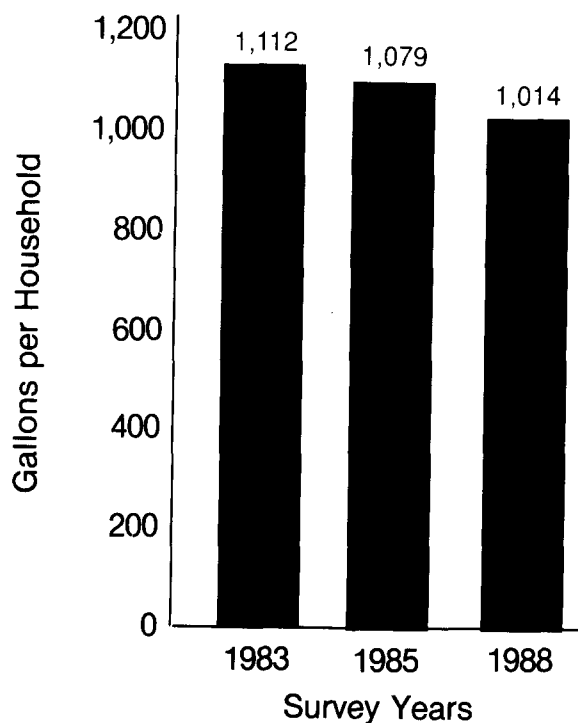
⁴Statistics for 1988 total energy consumption, total petroleum consumption, and total vehicle fuel used in the transportation sector are from Energy Information Administration, *Monthly Energy Review*, June 1989 DOE/EIA-0035(89/06)

Average Vehicle Fuel Consumption

The average per household and per vehicle motor-fuel consumption in the 1988 RTECS was less than in the 1985 RTECS. In 1988, an average of 559 gallons per vehicle and 1,014 gallons per household of vehicle fuel was consumed compared to 611 gallons per vehicle and 1,079 gallons per household in 1985.

The decrease in household consumption of vehicle fuel amounted to a 6 percent decrease per household. For the first time since the 1983 RTECS, the per household vehicle consumption declined by a statistically significant amount (Figure 12). This decrease occurred even though there was a 7 percent increase in average miles traveled per household between 1985 and 1988. Any conclusions pertaining to a drop in vehicle fuel consumption between the 1985 RTECS and the 1988 RTECS must be tempered by the fact that the methodology for measuring vehicle fuel consumption changed between the 1985 RTECS and the 1988 RTECS (See box on this page).

Figure 12. Average Vehicle Fuel Consumption per Household, 1983, 1985, and 1988



Source: Energy Information Administration, Office of Energy Markets and End Use, 1983, 1985, and 1988 Residential Transportation Energy Consumption Surveys.

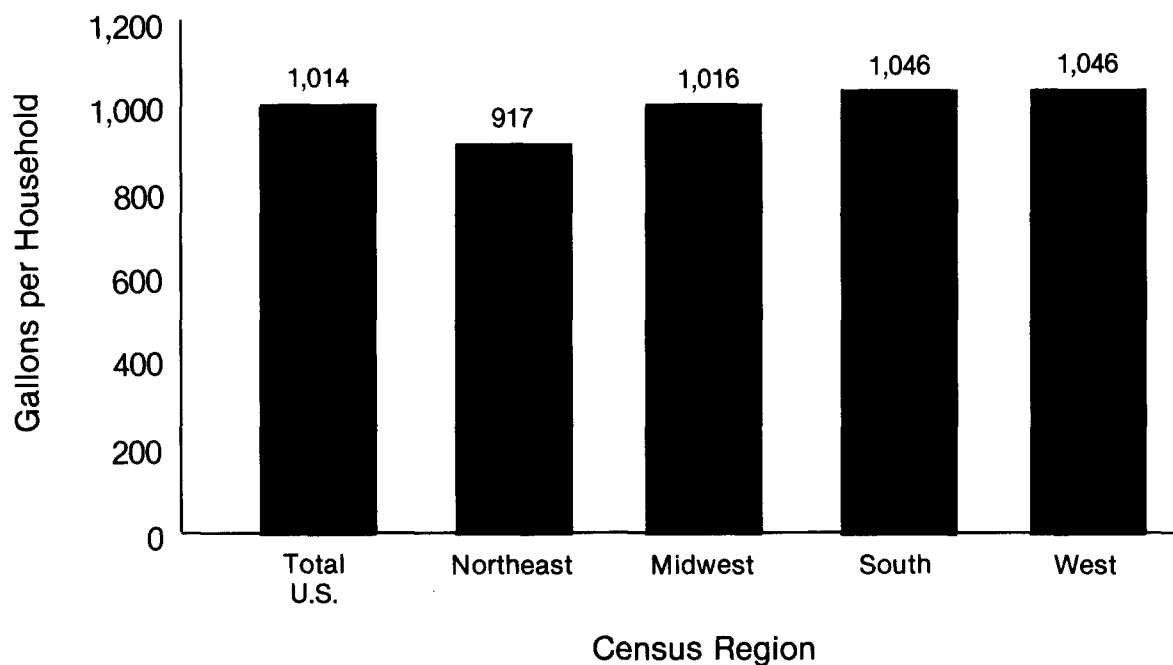
Measurement of Vehicle Fuel Consumption

In this report, vehicle fuel consumption is calculated as the annual miles traveled divided by the fuel efficiency, given in MPG, for each sample vehicle. In the 1988 RTECS, the methodology for estimating vehicle fuel consumption was based on the measured vehicle miles traveled obtained from the 1988 RTECS odometer readings and the assigned MPG that were obtained from the EPA laboratory test results, adjusted for on-road driving. In prior RTECS, MPG for sample vehicles were estimated from data reported in fuel purchase diaries maintained by the respondents. See Appendix B, "Estimation Methodologies" for a discussion about estimating the vehicle fuel consumption.

Regional Differences: Households in the Northeast Census Region used less vehicle fuel than households in other Census regions. In the Northeast, an average of 129 fewer gallons of vehicle fuel per household was consumed than in either the South or West Census Regions. Although households in the Northeast apparently consumed less than in the Midwest Census Region, the difference was not statistically significant

(Figure 13). Regional differences were also evident in per vehicle fuel consumption. However, only the difference in consumption between the Northeast and the South Census Regions was statistically significant. Vehicles in the Northeast used 11 percent less fuel than they used in the South Census Region (525 gallons per vehicle, 585 gallons per vehicle, respectively).

Figure 13. Average Vehicle Fuel Consumption per Household by Census Region, 1988



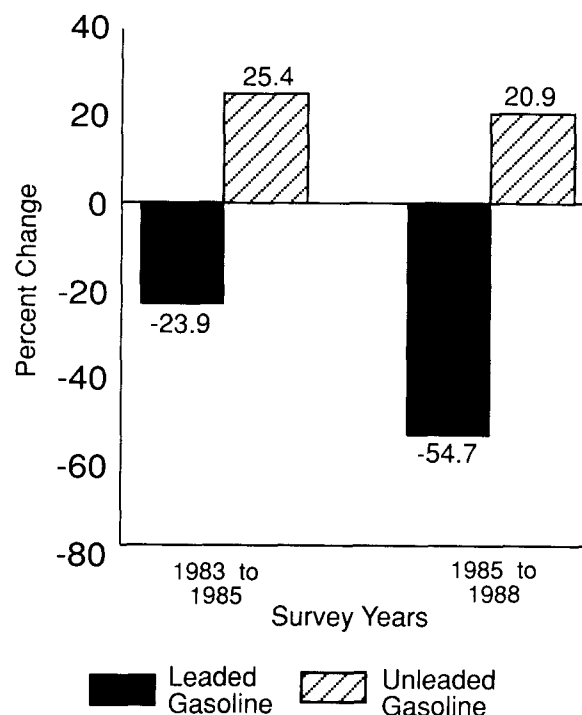
Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Type of Vehicle Fuel Used

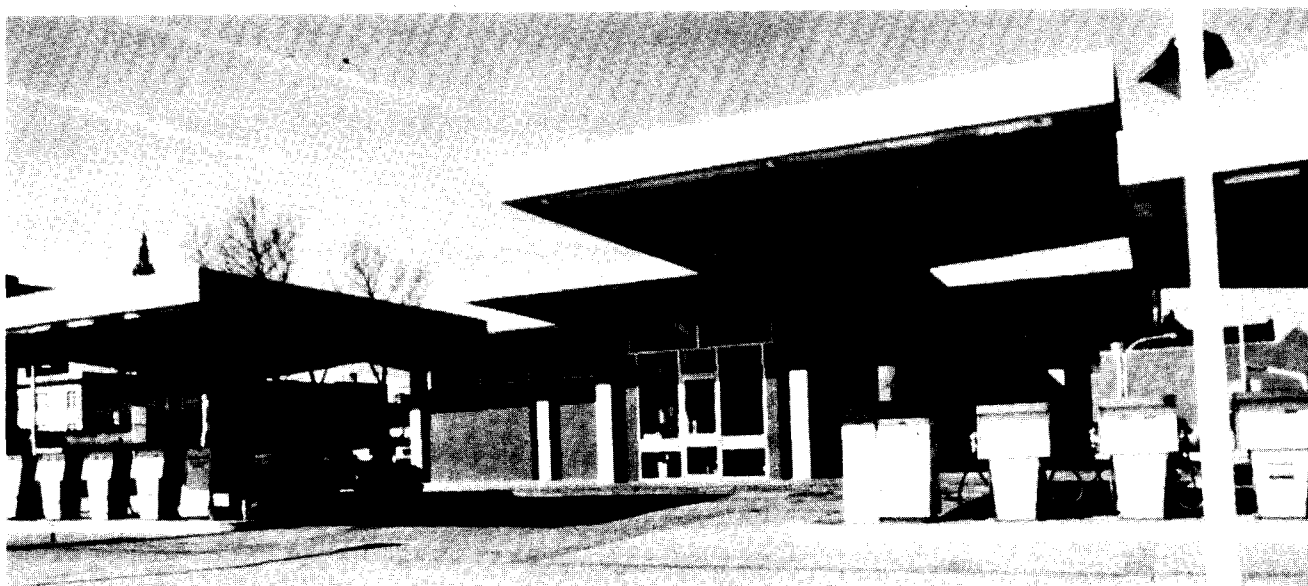
The 1988 RTECS collected information about: (1) whether the type of vehicle fuel used was gasoline, diesel, or other; (2) whether gasoline was leaded or unleaded; and (3) the grade of gasoline used. Gasoline was the primary type of vehicle fuel consumed, constituting 98 percent of the total 82.4 billion gallons of vehicle fuel used for personal transportation. The use of leaded gasoline has continued to decline, due to the retiring of older vehicles in the stock (Figure 14). Of the 81.1 billion gallons of gasoline consumed in 1988, 14 percent was leaded compared to 30 percent in 1985. The RTECS also collected information about the grade of unleaded gasoline used most often. In 1988, 29 percent of the unleaded gasoline consumed was premium gasoline, 65 percent was regular gasoline and 6 percent was an intermediate grade.

In 1988, 1.1 billion gallons of diesel fuel were consumed in the residential sector. Data on the use of alternative fuels, such as gasohol, were collected in the "other fuels" category of the RTECS questionnaire. Respondents reported that only .3 million vehicles of the 147.5 million vehicles were using an alternative fuel. (See Appendix C, "Quality of Data" for a discussion of underestimation in the RTECS of the use of alternative fuels.)

Figure 14. Percent Change in Consumption of Leaded and Unleaded Gasoline, 1983 and 1985, and 1985 and 1988



Source: Energy Information Administration, Office of Energy Markets and End Use, 1983, 1985, and 1988 Residential Transportation Energy Consumption Surveys.



Data on leaded, unleaded, and diesel fuels were collected in the RTECS.

Vehicle Fuel Expenditures

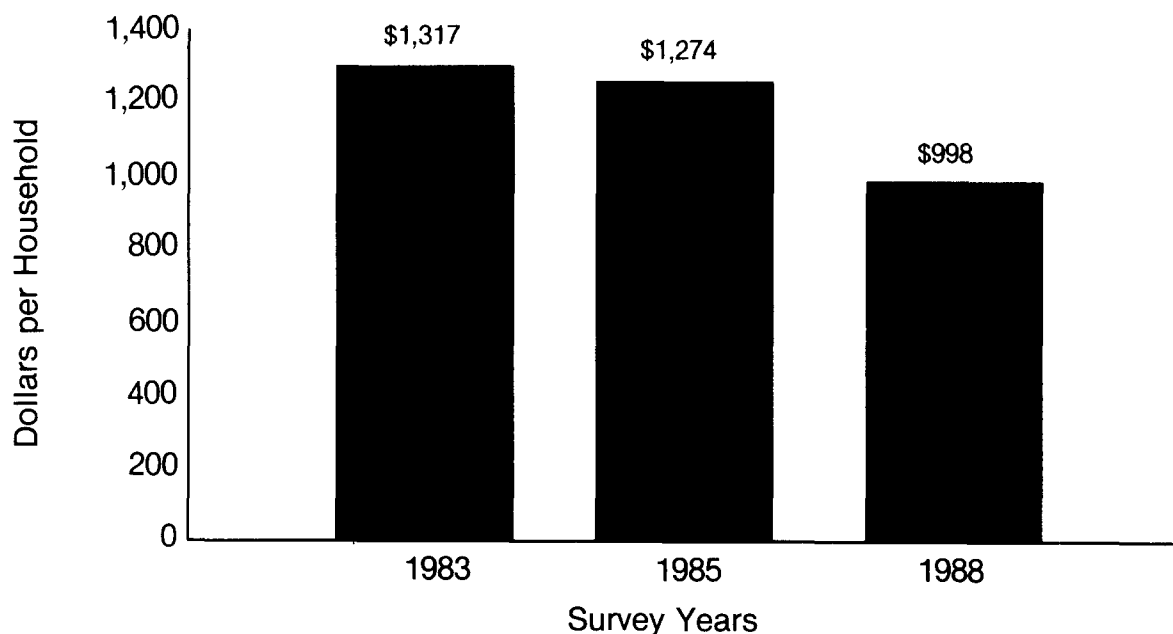
In 1988, households spent a total of \$81.1 billion for motor vehicle fuel in the United States. This was an average of \$998 per household. Between the 1985 and the 1988 RTECS, per household expenditures for vehicle fuel were approximately

22 percent less (Figure 15). This decrease was primarily due to the drop in gasoline prices between 1985 and 1988. In 1988, the average price paid for vehicle fuel was 98 cents per gallon. Vehicle fuel expenditures ranged from \$919 per household in the Middle Atlantic Census Division to \$1,058 per household in the Mountain Census Division.

Measurement of Vehicle Fuel Expenditures

In this report, vehicle fuel expenditures are calculated as the product of vehicle fuel consumption and the price of fuel. In this RTECS, the price of fuel, assigned to each sample vehicle, was obtained from the BLS Gasoline Price Series and the Lundberg Survey, Inc., Price Series (See Appendix C, "Quality of the Data" for a discussion of the assigned prices). Consumption of vehicle fuel was derived from the recorded mileage obtained in the RTECS and the assigned MPG obtained from the EPA laboratory test results, adjusted for on-road driving (See Appendix B, "Estimation Methodologies" for a discussion of estimation procedures used to determine vehicle fuel expenditures).

Figure 15. Average Vehicle Fuel Expenditures per Household, 1983, 1985, and 1988



Source: Energy Information Administration, Office of Energy Markets and End Use, 1983, 1985, and 1988 Residential Transportation Energy Consumption Surveys.

Approximately 34 percent of the 81.3 million households with vehicles spent between 2 and 3.9 percent of their family income for vehicle fuel. Another 18 percent of the households spent between 4 percent and 5.9 percent of their income for vehicle fuel. Approximately 22 percent of the RTECS respondents with vehicles spent 6 percent or more of their family income for vehicle fuel, while 27 percent spent less than 2 percent of their income. The percent of income spent for vehicle fuel varied considerably by family income, with

over 38 percent of the 22 million households with incomes of less than \$15,000 spending 8 percent or more for vehicle fuel. In comparison, only 2 percent of households with incomes between \$25,000 and \$49,999 spent 8 percent or more of their income for vehicle fuel. Among the higher income group (\$50,000 or more income), approximately 63 percent of the households spent less than 2 percent of their income for vehicle fuel (Table 5).

Table 5. Percent of Income Spent for Vehicle Fuel by Family Income, 1988
(Million Households)

	Total Households (million)	1987 Annual Family Income Categories			
		Less than \$15,000	\$15,000 to \$24,999	\$25,000 to \$49,999	\$50,000 or More
Total Households	81.3	22.0	16.9	28.9	13.2
Percent of Income Categories					
Less than 2 Percent	21.8	2.5	3.1	7.7	8.4
2 to 3.9 Percent	27.3	4.3	5.2	13.4	4.4
4 to 5.9 Percent	14.3	4.3	3.9	5.7	.4
6 to 7.9 Percent	6.8	2.6	2.6	1.4	Q
8 Percent or More	11.1	8.3	2.2	.5	NC

Q Data withheld either because the RSE was greater than 50 percent or fewer than 10 households were sampled.

NC No cases in sample.

Notes: •Family income is based on the 1987 annual income that is collected in the 1987 Residential Energy Consumption Survey, of which the RTECS is a subsample. •Data may not sum to totals because of rounding.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Combined Vehicle and Household Energy Expenditures

Household energy data were collected via the RECS in 1987. Energy consumption and expenditures data for the RECS households were obtained from the billing records maintained by the households' fuel suppliers. For those households that participated in both the 1987 RECS and 1988 RTECS, data were available on energy used within the home as well as energy used in personal vehicles. However, the time periods of consumption for these two energy-use components do not overlap, therefore, the transportation energy data represent energy consumed in personal vehicles during calendar year 1988. Household energy data represent energy consumed in the household during calendar year 1987. The assumption has been made of enough stability in expenditures over these two years (1987 and 1988) to allow summing of expenditures for household fuel and motor vehicle fuel.

Among households that had vehicles, the combined average of energy expenditures for both vehicle

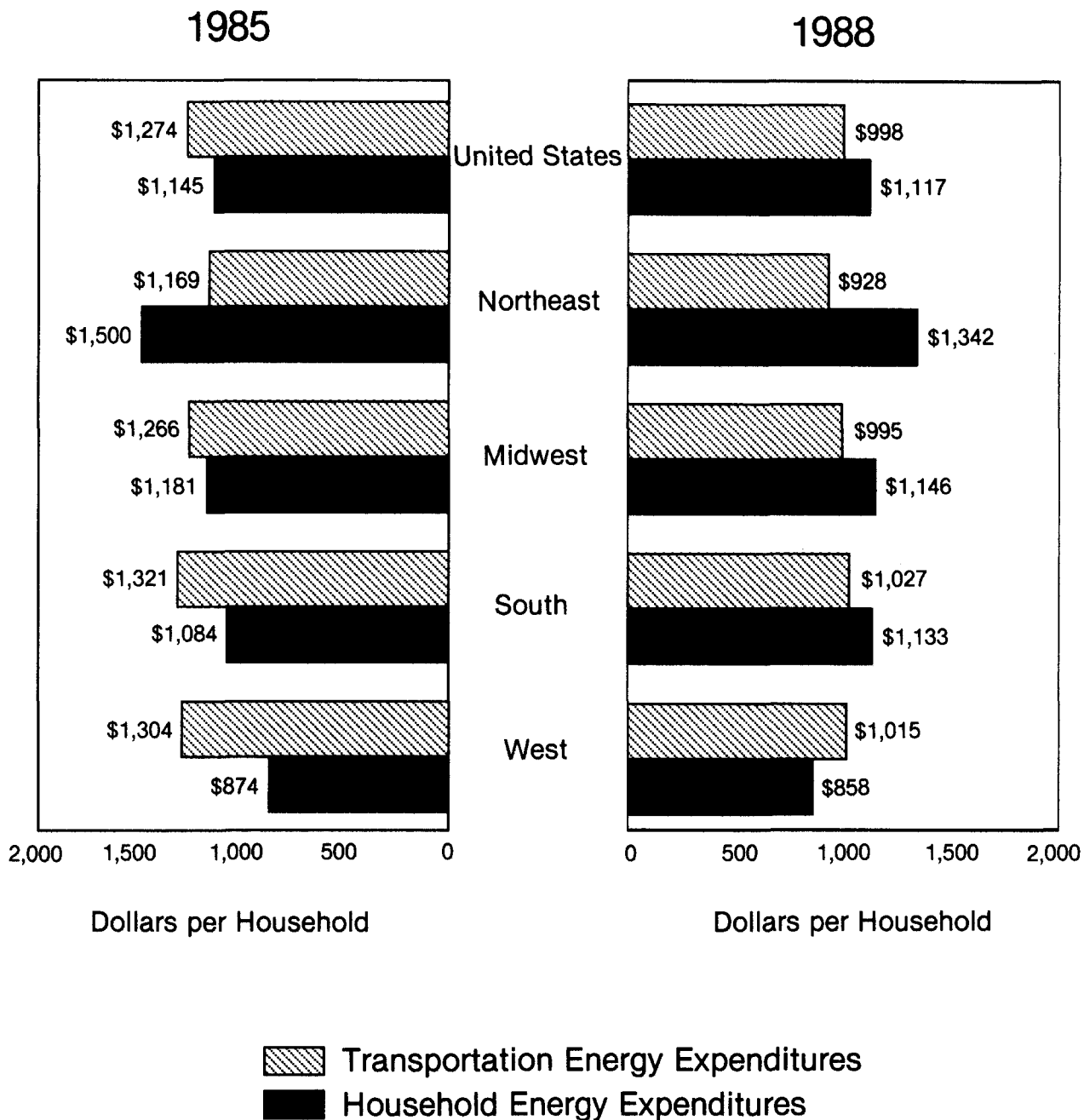
fuel and household energy was \$2,115 per household in 1988. The decrease in vehicle fuel expenditures resulted in households spending less for transportation than for household energy, a reversal of the situation in 1985. Approximately 47 percent (\$998) of total expenditures was used for motor vehicle fuel and 53 percent (\$1,117) was used for fuels consumed in the home. In 1985, the proportion of expenditures used for vehicle fuels was 53 percent of the total 1985 energy expenditures.

In all the Census regions except the West, a greater proportion of total energy expenditures was spent for energy used in the home. In the West Census Region, where there was less consumption of fuel for home heating, a greater proportion of expenditures was used for vehicle fuel. The proportion of expenditures used for household energy was highest in the Northeast with almost 60 percent of the energy expenditures in the Northeast Census Region used for household energy (Figure 16).



Pickup trucks were among the vehicle types surveyed in the RTECS.

Figure 16. Energy Expenditures per Household by Census Region, 1985 and 1988



Notes: •Data may differ slightly from the published Residential Energy Consumption Survey (RECS) reports because the Residential Transportation Energy Consumption Survey (RTECS) sample is a subsample of the households that participated in the RECS. Also, the 1988 RTECS sample is weighted to represent the number of U.S. households as of 1988. The RECS sample is weighted to represent the number of U.S. households as of 1987. •Expenditures cited in this figure are only for those households with motor vehicles that are used for personal transportation. •Transportation Energy Expenditures are the total dollar amounts spent for fuel in household motor vehicles. •Household Energy Expenditures are the total dollar amounts spent for energy used in the housing unit.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1984 and 1987 Residential Energy Consumption Surveys and 1985 and 1988 Residential Transportation Energy Consumption Surveys.

Detailed Statistics

The following tables present detailed characteristics of vehicles in the residential sector. Data are from the 1988 Residential Transportation Energy Consumption Survey. The "Glossary" contains the definitions of terms used in the tables.

Table Organization

The "Detailed Statistics" section consists of 3 types of tables: (1) Tables of totals such as number of vehicle miles traveled (VMT) or gallons consumed; (2) Tables of per household statistics such as VMT per household; and (3) Tables of per vehicle statistics such as vehicle fuel consumption per vehicle. The tables have been grouped together by specific topics such as model year data, or family income data to facilitate finding related information. The Quick Reference Guide

to the detailed statistics indicates major topics of each table.

Row and Column Factors

These tables present estimates of characteristics, vehicle fuel consumption, miles driven, and fuel efficiencies for all vehicles used for personal transportation in the United States. Since the estimates are based on a sample survey, they are subject to error. To help the reader compute an approximate relative standard error (RSE) for each of the estimates in the detailed tables, row and column factors are displayed on the top line and in the far right column of each table. To calculate the RSE for a specific estimates, multiply the row factor by the column factor. (See Figure C1 and the related discussion in Appendix C, "Quality of the Data," for more details.)

Quick Reference Guide

Topic	Table Number
Summary	6
Total Households	7,21,23
Per Household Data	7,14,15,17,22
Total Vehicles	6,9,16
Per Vehicle Data	8,11,18,20
Vehicle Fuel Consumption	6,7,8,11,13,15,19
Vehicle Fuel Expenditures	6,7,8,21,22
Total Household Energy Expenditures	22
Vehicle Fuel Efficiency (Miles per Gallon Data)	8,10,18
Vehicle Miles Traveled (VMT)	6,7,8,12,14,17,18,20
Model Year Data	9,10,11
Family Income	12,13,14,15
Household Composition	16,17
Vehicle Type	19,20
Changes in Vehicle Stock	23

Table 6. Number of Vehicles, Vehicle Miles, Vehicle Fuel Consumption and Expenditures, 1988

Household and Vehicle Characteristics	Number of Vehicles		Vehicle Miles Traveled		Consumption			Expenditures		RSE Row Factor
	(million)	(percent)	(billion)	(percent)	(billion gallons)	(gallon percent)	(quadrillion Btu)	(billion dollars)	(percent)	
RSE Column Factor:	0.967	0.968	1.000	0.960	1.076	0.967	1.075	1.077	0.971	
Household Characteristics										
Total	147.5	100.0	1,511	100.0	82.4	100.0	10.292	81.1	100.0	2.03
Census Region and Division										
Northeast	26.6	18.0	274	18.2	14.0	17.0	1.750	14.2	17.4	4.50
New England	6.6	4.4	67	4.4	3.4	4.1	.424	3.5	4.3	11.55
Middle Atlantic	20.1	13.6	208	13.7	10.6	12.9	1.326	10.7	13.2	4.84
Midwest	37.8	25.6	379	25.1	20.8	25.2	2.593	20.4	25.1	3.59
East North Central	26.0	17.6	263	17.4	14.3	17.3	1.787	14.0	17.3	5.34
West North Central	11.8	8.0	115	7.6	6.5	7.9	.806	6.3	7.8	6.29
South	50.6	34.3	534	35.3	29.6	35.9	3.701	29.1	35.8	3.26
South Atlantic	25.9	17.6	277	18.3	14.6	17.7	1.827	14.5	17.9	6.07
East South Central	9.4	6.4	98	6.5	5.6	6.8	.698	5.4	6.7	9.66
West South Central	15.2	10.3	159	10.5	9.4	11.4	1.176	9.2	11.3	10.13
West	32.5	22.0	325	21.5	18.1	21.9	2.248	17.5	21.6	4.23
Mountain	8.5	5.7	84	5.5	4.7	5.7	.587	4.5	5.6	10.71
Pacific	24.0	16.3	241	15.9	13.3	16.2	1.661	13.0	16.0	5.07
Metropolitan Status										
Metropolitan	113.9	77.2	1,171	77.5	62.6	76.0	7.841	61.9	76.3	1.77
Central City	38.7	26.3	376	24.9	20.5	24.8	2.562	20.1	24.8	4.83
Outside Central City	75.2	51.0	794	52.5	42.2	51.2	5.279	41.8	51.6	2.73
Nonmetropolitan	33.6	22.8	341	22.5	19.8	24.0	2.451	19.2	23.7	4.11
Household Size										
1 Person	19.8	13.4	183	12.1	9.9	12.1	1.241	9.8	12.1	5.89
2 Persons	51.3	34.8	481	31.8	26.6	32.2	3.306	26.1	32.2	4.38
3 Persons	28.8	19.5	322	21.3	17.2	20.9	2.151	16.9	20.8	5.63
4 Persons	26.8	18.2	295	19.5	15.9	19.3	1.985	15.7	19.4	5.63
5 or More Persons	20.8	14.1	230	15.2	12.8	15.6	1.609	12.6	15.5	7.27
Household Composition										
Households with Children	59.8	40.6	674	44.6	36.4	44.2	4.558	35.9	44.2	4.13
Age of Oldest Child										
Under 7 Years	17.3	11.7	196	13.0	10.2	12.4	1.282	10.1	12.4	8.07
7 to 15 Years	28.7	19.4	314	20.8	17.5	21.2	2.194	17.3	21.3	8.50
16 or 17 Years	13.8	9.4	164	10.9	8.7	10.5	1.082	8.5	10.5	9.02
Households without Children	87.7	59.4	837	55.4	46.0	55.8	5.733	45.3	55.8	3.12
One Adult	19.8	13.4	183	12.1	9.9	12.1	1.241	9.8	12.1	5.89
Age of Householder										
Under 35 Years	5.7	3.9	69	4.6	3.4	4.1	.425	3.3	4.1	14.72
35 to 59 Years	7.1	4.8	66	4.4	3.7	4.4	.457	3.6	4.4	11.75
60 Years or More	7.0	4.7	48	3.2	2.9	3.5	.358	2.8	3.5	10.72
Two or More Adults	67.9	46.0	654	43.3	36.1	43.8	4.492	35.5	43.7	3.82
Age of Householder										
Under 35 Years	14.3	9.7	164	10.8	8.3	10.1	1.039	8.2	10.1	9.47
35 to 59 Years	29.4	19.9	300	19.9	16.7	20.2	2.069	16.4	20.2	6.00
60 Years or More	24.2	16.4	190	12.6	11.1	13.5	1.384	10.9	13.4	9.41
Origin of Householder										
White	132.2	89.6	1,346	89.0	73.5	89.2	9.174	72.3	89.1	1.83
Black	10.6	7.2	115	7.6	6.2	7.5	.774	6.2	7.6	15.74
Other	4.7	3.2	51	3.4	2.8	3.3	.343	2.7	3.3	20.65
Hispanic Descent										
Yes	7.6	5.1	79	5.2	4.5	5.4	.556	4.4	5.4	15.47
No	139.9	94.9	1,432	94.8	78.0	94.6	9.736	76.7	94.6	2.18

See footnote at end of table

Table 6. Number of Vehicles, Vehicle Miles, Vehicle Fuel Consumption and Expenditures, 1988 (Continued)

Household and Vehicle Characteristics	Number of Vehicles		Vehicle Miles Traveled		Consumption			Expenditures		RSE Row Factor
	(million)	(percent)	(billion)	(percent)	(billion gallons)	(gallon percent)	(quadrillion Btu)	(billion dollars)	(percent)	
RSE Column Factor:	0.967	0.868	1.060	0.960	1.076	0.967	1.075	1.077	0.971	
1987 Family Income										
Less than \$10,000	13.3	9.0	111	7.4	6.6	8.0	0.827	6.4	7.9	11.33
\$10,000 to \$14,999	17.0	11.5	153	10.2	9.0	10.9	1.130	8.8	10.8	6.45
\$15,000 to \$19,999	13.3	9.0	132	8.7	7.3	8.9	.914	7.2	8.9	9.31
\$20,000 to \$24,999	15.1	10.2	154	10.2	8.5	10.3	1.060	8.3	10.3	8.07
\$25,000 to \$34,999	29.2	19.8	297	19.7	16.4	19.9	2.043	16.1	19.9	5.64
\$35,000 to \$49,999	28.3	19.2	313	20.7	16.5	20.0	2.058	16.3	20.1	5.19
\$50,000 to \$74,999	20.5	13.9	226	15.0	11.8	14.3	1.471	11.6	14.3	5.96
\$75,000 or More	10.8	7.3	124	8.2	6.3	7.7	.790	6.3	7.8	12.69
Below 100% of Poverty	9.4	6.3	82	5.4	5.0	6.1	.632	4.9	6.0	13.70
Below 125% of Poverty	16.3	11.1	148	9.8	8.9	10.7	1.105	8.6	10.6	9.12
Number of Drivers (fall 1987)										
1	28.7	19.5	262	17.4	14.4	17.4	1.787	14.2	17.5	4.91
2	83.3	56.5	854	56.5	46.7	56.7	5.839	46.0	56.6	2.90
3	21.4	14.5	237	15.7	13.0	15.7	1.623	12.8	15.8	7.02
4 or More	13.2	9.0	152	10.1	8.0	9.7	.997	7.8	9.7	9.90
Average Number of Vehicles per Household per year										
Part-Year Vehicle	2.1	1.5	20	1.4	1.2	1.5	.153	1.2	1.5	25.93
Only 1	24.5	16.6	249	16.5	12.9	15.6	1.604	12.7	15.7	4.76
Between 1 and 2	13.7	9.3	155	10.2	8.5	10.3	1.062	8.4	10.3	6.39
Only 2	48.7	33.0	492	32.6	26.7	32.5	3.337	26.4	32.6	3.87
Between 2 and 3	19.9	13.5	209	13.8	11.4	13.8	1.426	11.1	13.7	6.81
Only 3	17.6	12.0	170	11.3	9.5	11.5	1.188	9.4	11.5	8.56
Between 3 and 4	9.5	6.5	102	6.8	5.8	7.0	.720	5.6	6.9	11.03
4 or More	11.4	7.7	113	7.5	6.4	7.8	.802	6.3	7.7	12.66
Vehicle Characteristics										
Model Year										
1988 or 1989	7.1	4.8	92	6.1	4.2	5.0	.520	4.2	5.2	9.35
1987	12.0	8.1	160	10.6	7.0	8.5	.871	7.0	8.6	6.66
1986	15.5	10.5	195	12.9	8.9	10.8	1.111	8.9	11.0	6.48
1985	13.2	8.9	159	10.5	7.5	9.1	.939	7.5	9.3	6.60
1984	13.3	9.0	153	10.1	7.3	8.9	.917	7.3	9.0	5.55
1983	8.1	5.5	86	5.7	4.1	5.0	.512	4.1	5.0	6.50
1982	8.1	5.5	87	5.8	4.1	5.0	.510	4.1	5.1	9.00
1981	8.4	5.7	84	5.6	4.2	5.1	.522	4.2	5.1	8.50
1979 or 1980	17.0	11.5	161	10.7	9.7	11.8	1.220	9.6	11.8	5.96
1977 or 1978	15.7	10.7	137	9.1	9.4	11.4	1.172	9.2	11.3	7.09
1975 or 1976	9.9	6.7	76	5.1	5.9	7.1	.729	5.7	7.0	8.56
1974 or Earlier	19.3	13.1	121	8.0	10.2	12.3	1.268	9.4	11.6	8.09
Type of Vehicle										
Passenger Car	109.3	74.1	1,134	75.0	57.5	69.8	7.200	57.1	70.4	1.88
Mini Van	2.2	1.5	28	1.9	1.4	1.8	.181	1.4	1.8	14.96
Jeep-Like Vehicle	4.8	3.2	56	3.7	3.7	4.4	.454	3.6	4.5	11.46
Large Van	4.7	3.2	46	3.0	3.5	4.2	.438	3.3	4.1	12.32
Pickup Truck	25.9	17.6	244	16.2	15.9	19.3	1.971	15.3	18.8	4.82
Other .....	.7	.4	3	.2	.4	.5	.048	.4	.4	33.22
Fuel Efficiency (miles per gallon)										
10.9 or Less	15.7	10.6	88	5.8	9.5	11.5	1.170	8.9	11.0	7.17
11 to 12.9	12.5	8.5	96	6.4	8.0	9.7	1.001	7.7	9.5	8.81
13 to 15.9	24.3	16.5	216	14.3	14.9	18.1	1.858	14.5	17.9	5.96
16 to 18.9	24.2	16.4	243	16.1	13.9	16.9	1.741	13.8	17.1	5.52
19 to 21.9	26.0	17.6	307	20.3	15.0	18.2	1.884	15.1	18.6	6.44
22 or More	44.1	29.9	561	37.1	21.1	25.6	2.637	21.0	25.9	3.30

See footnote at end of table

Table 6. Number of Vehicles, Vehicle Miles, Vehicle Fuel Consumption and Expenditures, 1988 (Continued)

Household and Vehicle Characteristics	Number of Vehicles		Vehicle Miles Traveled		Consumption			Expenditures		RSE Row Factor
	(million)	(percent)	(billion)	(percent)	(billion gallons)	(gallon percent)	(quadrillion Btu)	(billion dollars)	(percent)	
RSE Column Factor	0.967	0.988	1.060	0.960	1.076	0.967	1.076	1.077	0.971	
Engine Size (liters)										
2.49 or Less	49.4	33.5	558	36.9	22.0	26.7	2.759	21.9	27.0	3.67
2.50 to 3.49	21.7	14.7	248	16.4	12.1	14.7	1.518	12.1	14.9	5.48
3.50 to 4.49	21.3	14.4	205	13.6	11.5	14.0	1.445	11.5	14.1	5.57
4.50 or Greater	55.2	37.4	501	33.1	36.7	44.5	4.570	35.6	43.9	4.08
Number of Cylinders										
4	55.3	37.5	623	41.2	25.0	30.4	3.130	24.8	30.6	3.99
6	36.0	24.4	380	25.1	20.5	24.9	2.565	20.3	25.0	4.44
8	55.2	37.4	497	32.9	36.4	44.2	4.536	35.5	43.7	3.98
Other	1.0	.7	11	.7	.5	.6	.061	.5	.6	20.24
Type of Transmission										
Automatic	105.6	71.6	1,068	70.7	62.3	75.6	7.777	61.4	75.7	2.04
Manual Shift	41.9	28.4	443	29.3	20.1	24.4	2.514	19.7	24.3	4.84
Type of Drive										
Front-Wheel	47.9	32.5	567	37.5	23.7	28.7	2.963	23.7	29.2	3.60
Rear-Wheel	89.1	60.4	833	55.1	51.6	62.6	6.438	50.5	62.2	2.38
4-Wheel	10.4	7.1	111	7.4	7.1	8.7	.891	7.0	8.6	8.64
Type of Fuel System										
Carburetor	111.5	75.6	1,073	71.0	62.3	75.6	7.760	60.8	74.9	2.00
Fuel Injection	33.9	23.0	415	27.4	19.0	23.1	2.378	19.2	23.7	3.94
Diesel Engine	2.1	1.4	24	1.6	1.1	1.3	.154	1.1	1.4	18.33
Type of Fuel Purchased										
Motor Gasoline	145.1	98.4	1,484	98.2	81.1	98.4	10.138	79.8	98.3	1.96
Unleaded	125.2	84.9	1,338	88.6	69.9	84.8	8.744	69.7	86.0	1.97
Regular Grade	80.7	54.7	851	56.3	45.1	54.7	5.635	42.6	52.5	2.91
Intermediate Grade	7.7	5.2	87	5.7	4.4	5.4	.553	4.5	5.6	11.07
Premium Grade	36.9	25.0	401	26.5	20.4	24.8	2.556	22.6	27.9	4.85
Leaded	19.9	13.5	146	9.7	11.1	13.5	1.394	10.0	12.3	7.51
Diesel Fuel	2.1	1.4	24	1.6	1.1	1.3	.154	1.1	1.4	18.33
Type of Primary Service										
Full-Service Pumps	22.3	15.1	210	13.9	11.0	13.4	1.379	11.1	13.7	9.26
Self or Mini-Service Pumps	119.5	81.0	1,242	82.2	68.1	82.7	8.512	66.8	82.4	2.18
Both Equally	5.5	3.7	56	3.7	3.1	3.7	.386	3.0	3.8	14.57
Vehicle Used on the Job										
Yes	17.1	11.6	211	14.0	11.4	13.8	1.423	11.2	13.9	6.68
No	130.4	88.4	1,300	86.0	71.0	86.2	8.869	69.9	86.1	1.64

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 7. U.S. per Household Vehicle Miles Traveled, Vehicle Fuel Consumption and Expenditures, 1988

Household Characteristics	Number of Households (million)	Average per Household				RSE Row Factor
		Number of Vehicles	Vehicle Miles Traveled	Consumption (gallons)	Expenditures (dollars)	
RSE Column Factor	1.480	0.640	0.987	1.037	1.032	
Household Characteristics						
Total	81.3	1.8	18,595	1,014	998	1.65
Census Region and Division						
Northeast	15.2	1.7	17,997	917	928	3.84
New England	3.6	1.8	18,581	942	959	9.33
Middle Atlantic	11.6	1.7	17,817	909	919	4.20
Midwest	20.4	1.8	18,518	1,016	995	2.97
East North Central	14.3	1.8	18,350	996	977	3.86
West North Central	6.1	1.9	18,913	1,062	1,039	4.94
South	28.3	1.8	18,859	1,046	1,027	2.97
South Atlantic	14.2	1.8	19,525	1,028	1,020	4.42
East South Central	5.4	1.8	18,180	1,036	1,008	5.46
West South Central	8.7	1.7	18,193	1,081	1,051	5.92
West	17.3	1.9	18,783	1,046	1,015	3.70
Mountain	4.3	2.0	19,581	1,105	1,058	8.19
Pacific	13.0	1.8	18,520	1,027	1,001	4.29
Metropolitan Status						
Metropolitan	63.0	1.8	18,586	995	983	1.93
Central City	24.0	1.6	15,669	852	836	3.63
Outside Central City	39.0	1.9	20,385	1,083	1,074	2.32
Nonmetropolitan	18.3	1.8	18,627	1,081	1,050	3.14
Household Size						
1 Person	16.9	1.2	10,813	586	577	3.95
2 Persons	28.6	1.8	16,817	928	912	2.54
3 Persons	14.2	2.0	22,679	1,209	1,189	3.25
4 Persons	12.6	2.1	23,323	1,257	1,245	3.47
5 or More Persons	8.9	2.3	25,930	1,449	1,422	4.39
Household Composition						
Households with Children	29.9	2.0	22,519	1,216	1,198	2.67
Age of Oldest Child						
Under 7 Years	9.5	1.8	20,612	1,077	1,057	3.82
7 to 15 Years	14.7	1.9	21,301	1,188	1,173	3.48
16 or 17 Years	5.7	2.4	28,854	1,521	1,497	5.90
Households without Children	51.3	1.7	16,307	896	882	2.32
One Adult	16.9	1.2	10,813	586	577	3.95
Age of Householder						
Under 35 Years	5.0	1.1	13,841	680	672	8.31
35 to 59 Years	5.3	1.3	12,476	689	680	6.73
60 Years or More	6.7	1.0	7,229	434	426	6.42
Two or More Adults	34.4	2.0	19,015	1,049	1,032	2.43
Age of Householder						
Under 35 Years	8.1	1.8	20,300	1,028	1,015	4.83
35 to 59 Years	12.8	2.3	23,420	1,298	1,277	3.62
60 Years or More	13.5	1.8	14,058	824	808	3.66
Origin of Householder						
White	71.5	1.8	18,824	1,028	1,011	1.76
Black	7.2	1.5	16,006	864	861	7.93
Other	2.6	1.8	19,441	1,047	1,029	10.39
Hispanic Descent						
Yes	4.2	1.8	18,674	1,049	1,037	10.22
No	77.0	1.8	18,591	1,012	996	1.62

See footnote at end of table

Table 7. U.S. per Household Vehicle Miles Traveled, Vehicle Fuel Consumption and Expenditures, 1988 (Continued)

Household Characteristics	Number of Households (million)	Average per Household				RSE Row Factor
		Number of Vehicles	Vehicle Miles Traveled	Consumption (gallons)	Expenditures (dollars)	
RSE Column Factor:	1.480	0.640	0.997	1.037	1.032	
1987 Family Income						
Less than \$10,000	10.2	1.3	10,932	652	631	6.62
\$10,000 to \$14,999	11.8	1.4	12,978	762	743	5.26
\$15,000 to \$19,999	8.3	1.6	15,837	879	868	5.40
\$20,000 to \$24,999	8.6	1.7	17,813	980	962	4.72
\$25,000 to \$34,999	16.0	1.8	18,617	1,025	1,009	3.44
\$35,000 to \$49,999	12.9	2.2	24,170	1,275	1,261	3.27
\$50,000 to \$74,999	8.8	2.3	25,555	1,330	1,314	4.31
\$75,000 or More	4.5	2.4	27,428	1,391	1,391	6.60
Below 100% of Poverty	6.6	1.4	12,404	760	736	7.32
Below 125% of Poverty	11.3	1.4	13,136	785	762	5.43
Number of Drivers (fall 1987)						
1	24.2	1.2	10,842	594	585	3.25
2	43.8	1.9	19,503	1,068	1,050	1.91
3	8.3	2.6	28,536	1,561	1,541	3.96
4 or More	4.2	3.2	36,583	1,920	1,885	4.83
Average Number of Vehicles per Household per year						
Part-Year Vehicle	3.9	.6	5,271	316	309	18.91
Only 1	24.5	1.0	10,170	526	521	3.14
Between 1 and 2	9.1	1.5	17,049	936	922	3.72
Only 2	24.3	2.0	20,251	1,100	1,087	2.18
Between 2 and 3	8.2	2.4	25,456	1,386	1,356	3.64
Only 3	5.9	3.0	28,995	1,614	1,592	5.01
Between 3 and 4	2.8	3.4	36,820	2,078	2,023	4.02
4 or More	2.7	4.3	42,332	2,407	2,341	4.86

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 8. U.S. per Vehicle Miles Traveled, Vehicle Fuel Consumption and Expenditures, 1988

Household and Vehicle Characteristics	Number of Vehicles (million)	Average per Vehicle			Miles per Gallon	RSE Raw Factor
		Vehicle Miles Traveled	Consumption (gallons)	Expenditures (dollars)		
RSE Column Factor:	1.788	1.018	1.031	1.030	0.542	
Household Characteristics						
Total	147.5	10,246	559	550	18.3	1.42
Census Region and Division						
Northeast	26.6	10,311	525	532	19.6	2.53
New England	6.6	10,195	517	526	19.7	5.98
Middle Atlantic	20.1	10,349	528	534	19.6	2.70
Midwest	37.8	10,021	550	539	18.2	2.36
East North Central	26.0	10,124	550	539	18.4	3.00
West North Central	11.8	9,794	550	538	17.8	4.15
South	50.6	10,550	585	575	18.0	2.84
South Atlantic	25.9	10,701	563	559	19.0	3.93
East South Central	9.4	10,357	590	574	17.6	5.97
West South Central	15.2	10,412	619	602	16.8	6.06
West	32.5	9,980	556	540	18.0	3.26
Mountain	8.5	9,887	558	534	17.7	4.97
Pacific	24.0	10,013	555	541	18.0	3.93
Metropolitan Status						
Metropolitan	113.9	10,278	550	544	18.7	1.57
Central City	38.7	9,720	529	519	18.4	2.73
Outside Central City	75.2	10,565	561	556	18.8	1.95
Nonmetropolitan	33.6	10,137	588	571	17.2	3.22
Household Size						
1 Person	19.8	9,243	501	494	18.4	3.69
2 Persons	51.3	9,381	518	509	18.1	2.89
3 Persons	28.8	11,180	596	586	18.8	2.09
4 Persons	26.8	11,005	593	587	18.6	2.65
5 or More Persons	20.8	11,062	618	607	17.9	3.66
Household Composition						
Households with Children	59.8	11,268	609	599	18.5	1.88
Age of Oldest Child						
Under 7 Years	17.3	11,322	592	580	19.1	3.84
7 to 15 Years	28.7	10,947	611	603	17.9	2.81
16 or 17 Years	13.8	11,865	625	615	19.0	3.84
Households Without Children	87.7	9,548	525	516	18.2	2.14
One Adult	19.8	9,243	501	494	18.4	3.69
Age of Householder						
Under 35 Years	5.7	12,052	592	585	20.3	7.04
35 to 59 Years	7.1	9,299	514	506	18.1	6.98
60 Years or More	7.0	6,890	413	406	16.7	6.33
Two or More Adults	67.9	9,637	532	523	18.1	2.44
Age of Householder						
Under 35 Years	14.3	11,414	578	570	19.7	5.03
35 to 59 Years	29.4	10,238	567	558	18.0	3.52
60 Years or More	24.2	7,852	460	451	17.1	3.54
Origin of Householder						
White	132.2	10,182	556	547	18.3	1.53
Black	10.6	10,769	581	579	18.5	5.83
Other	4.7	10,860	585	575	18.6	10.17
Hispanic Descent						
Yes	7.6	10,476	588	582	17.8	7.97
No	139.9	10,233	557	548	18.4	1.44

See footnote at end of table

Table 8. U.S. per Vehicle Miles Traveled, Vehicle Fuel Consumption and Expenditures, 1988 (Continued)

Household and Vehicle Characteristics	Number of Vehicles (million)	Average per Vehicle			Miles per Gallon	RSE Row Factor
		Vehicle Miles Traveled	Consumption (gallons)	Expenditures (dollars)		
RSE Column Factor:	1.709	1.018	1.031	1.030	0.542	
1987 Family Income						
Less than \$10,000	13.3	8,377	500	483	16.8	6.06
\$10,000 to \$14,999	17.0	9,053	532	518	17.0	5.25
\$15,000 to \$19,999	13.3	9,884	549	542	18.0	4.88
\$20,000 to \$24,999	15.1	10,193	561	551	18.2	3.84
\$25,000 to \$34,999	29.2	10,173	560	551	18.2	2.81
\$35,000 to \$49,999	28.3	11,053	583	577	19.0	2.63
\$50,000 to \$74,999	20.5	11,026	574	567	19.2	3.22
\$75,000 or More	10.8	11,538	585	585	19.7	5.57
Below 100% of Poverty	9.4	8,805	540	522	16.3	6.05
Below 125% of Poverty	16.3	9,089	543	527	16.7	4.34
Number of Drivers (fall 1987)						
1	28.7	9,144	501	494	18.3	3.25
2	83.3	10,243	561	551	18.3	1.86
3	21.4	11,042	604	596	18.3	3.45
4 or More	13.2	11,530	605	594	19.1	4.20
Average Number of Vehicles per Household per year						
Part-Year Vehicle	2.1	9,546	572	559	16.7	13.43
Only 1	24.5	10,167	526	521	19.3	3.00
Between 1 and 2	13.7	11,262	618	609	18.2	4.56
Only 2	48.7	10,123	550	543	18.4	2.19
Between 2 and 3	19.9	10,492	571	559	18.4	3.50
Only 3	17.6	9,664	538	531	18.0	4.86
Between 3 and 4	9.5	10,730	606	590	17.7	5.21
4 or More	11.4	9,914	564	548	17.6	5.82
Vehicle Characteristics						
Model Year						
1988 or 1989	7.1	12,920	583	589	22.1	4.31
1987	12.0	13,408	584	585	22.9	3.16
1986	15.5	12,570	573	575	21.9	3.09
1985	13.2	12,074	569	572	21.2	3.23
1984	13.3	11,506	552	548	20.9	3.29
1983	8.1	10,610	504	503	21.1	4.43
1982	8.1	10,752	506	506	21.2	4.06
1981	8.4	10,021	499	496	20.1	4.35
1979 or 1980	17.0	9,480	572	565	16.6	3.85
1977 or 1978	15.7	8,715	600	584	14.5	3.92
1975 or 1976	9.9	7,706	594	571	13.0	5.67
1974 or Earlier	19.3	6,271	528	489	11.9	6.02
Type of Vehicle						
Passenger Car	109.3	10,372	526	523	19.7	1.53
Mini Van	2.2	12,650	653	649	19.4	7.10
Jeep-Like Vehicle	4.8	11,843	767	761	15.4	5.98
Large Van	4.7	9,774	747	709	13.1	5.65
Pickup Truck	25.9	9,433	615	590	15.3	3.17
Other .....	.7	4,862	584	548	8.3	21.21
Fuel Efficiency (miles per gallon)						
10.9 or Less	15.7	5,584	606	570	9.2	4.50
11 to 12.9	12.5	7,682	640	617	12.0	4.99
13 to 15.9	24.3	8,882	611	597	14.5	4.03
16 to 18.9	24.2	10,063	576	573	17.5	3.13
19 to 21.9	26.0	11,836	579	580	20.4	2.77
22 or More	44.1	12,708	477	476	26.6	1.59

See footnote at end of table

Table 8. U.S. per Vehicle Miles Traveled, Vehicle Fuel Consumption and Expenditures, 1988 (Continued)

Household and Vehicle Characteristics	Number of Vehicles (million)	Average per Vehicle			Miles per Gallon	RSE Row Factor
		Vehicle Miles Traveled	Consumption (gallons)	Expenditures (dollars)		
RSE Column Factor:	1.700	1.018	1.031	1.030	0.542	
Engine Size (liters)						
2.49 or Less	49.4	11,303	447	443	25.3	1.84
2.50 to 3.49	21.7	11,440	561	560	20.4	2.86
3.50 to 4.49	21.3	9,637	542	539	17.8	3.25
4.50 or Greater	27.8	8,196	694	666	11.8	3.77
Number of Cylinders						
4	55.3	11,269	453	449	24.9	1.84
6	36.0	10,539	570	564	18.5	2.46
8	55.2	9,009	659	642	13.7	2.44
Other	1.0	11,340	485	492	23.4	13.98
Type of Transmission						
Automatic	105.6	10,116	590	581	17.1	1.58
Manual Shift	41.9	10,572	480	470	22.0	2.45
Type of Drive						
Front-Wheel	47.9	11,831	494	494	23.9	1.89
Rear-Wheel	89.1	9,345	579	566	16.1	1.97
4-Wheel	10.4	10,651	683	666	15.6	4.31
Type of Fuel System						
Carburetor	111.5	9,620	558	545	17.2	1.79
Fuel Injection	33.9	12,248	562	568	21.8	2.09
Diesel Engine	2.1	11,166	519	530	21.5	8.20
Type of Fuel Purchased						
Motor Gasoline	145.1	10,230	559	550	18.3	1.40
Unleaded	125.2	10,686	558	557	19.1	1.46
Regular Grade	80.7	10,543	558	528	18.9	1.82
Intermediate Grade	7.7	11,312	577	592	19.6	5.53
Premium Grade	36.9	10,872	554	613	19.6	2.50
Leaded	19.9	7,353	561	504	13.1	4.63
Diesel Fuel	2.1	11,166	519	530	21.5	8.20
Type of Primary Service						
Full-Service Pumps	22.3	9,444	496	498	19.1	3.53
Self or Mini-Service Pumps	119.5	10,396	570	560	18.2	1.61
Both Equally	5.5	10,287	563	556	18.3	6.93
Vehicle Used on the Job						
Yes	17.1	12,383	669	659	18.5	3.33
No	130.4	9,966	544	536	18.3	1.51

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse.

• Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 9. U.S. Vehicles by Model Year, 1988
(Million Vehicles)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor:	0.398	1.405	1.319	1.118	1.185	0.811	1.071	1.048	1.124	0.905	
Household Characteristics											
Total	147.5	7.1	12.0	15.5	13.2	21.4	16.5	17.0	15.7	29.2	3.81
Census Region and Division											
Northeast	26.6	1.4	2.9	3.2	2.6	4.7	3.2	2.9	2.3	3.4	10.04
New England	6.6	.3	.9	.8	.7	1.1	.6	.7	.6	.8	19.97
Middle Atlantic	20.1	1.1	2.0	2.3	1.9	3.6	2.6	2.2	1.7	2.7	11.89
Midwest	37.8	1.9	2.7	3.7	3.6	5.4	4.3	4.7	4.6	6.8	7.12
East North Central	26.0	1.5	1.8	3.1	2.6	3.5	2.8	3.1	3.2	4.2	8.24
West North Central	11.8	.4	.9	.7	1.0	1.9	1.4	1.6	1.4	2.6	13.47
South	50.6	2.7	4.0	5.4	4.4	6.9	6.1	5.8	5.5	9.7	6.65
South Atlantic	25.9	1.7	2.1	3.0	2.6	4.1	2.7	2.6	2.4	4.7	10.94
East South Central	9.4	.3	.7	1.0	.7	1.1	1.2	1.2	1.2	2.0	13.56
West South Central	15.2	.7	1.1	1.5	1.1	1.7	2.2	2.1	1.9	3.0	14.25
West	32.5	1.0	2.4	3.2	2.5	4.3	2.9	3.6	3.3	9.2	7.51
Mountain	8.5	Q	.7	.8	.7	.9	.7	1.0	1.1	2.5	14.82
Pacific	24.0	.9	1.7	2.3	1.8	3.5	2.2	2.6	2.2	6.8	9.39
Metropolitan Status											
Metropolitan	113.9	5.7	9.9	12.9	10.4	17.1	12.6	12.6	12.1	20.7	4.44
Central City	38.7	1.5	3.1	4.1	3.2	5.4	4.4	4.5	4.6	7.8	7.24
Outside Central City	75.2	4.2	6.7	8.8	7.3	11.6	8.1	8.0	7.4	12.9	5.81
Nonmetropolitan	33.6	1.5	2.1	2.6	2.7	4.3	3.9	4.5	3.7	8.4	7.39
Household Size											
1 Person	19.8	1.0	1.5	1.7	1.6	3.4	2.4	2.1	1.8	4.4	11.71
2 Persons	51.3	2.5	4.0	5.9	4.8	7.3	5.3	5.6	5.3	10.6	7.58
3 Persons	28.8	1.4	2.9	2.8	2.6	4.2	3.4	3.6	2.8	5.1	9.25
4 Persons	26.8	1.3	2.1	3.0	2.3	3.8	3.1	3.1	3.0	5.1	10.24
5 or More Persons	20.8	.9	1.5	2.1	1.8	2.7	2.4	2.6	2.8	4.1	11.68
Household Composition											
Households with Children	59.8	3.0	4.9	6.3	5.1	8.6	6.9	7.0	7.0	11.0	6.59
Age of Oldest Child											
Under 7 Years	17.3	.9	1.5	2.1	1.3	2.5	2.0	1.8	1.8	3.3	11.78
7 to 15 Years	28.7	1.2	2.4	2.7	2.6	4.0	2.9	3.4	3.6	5.8	9.82
16 or 17 Years	13.8	.8	.9	1.5	1.2	2.1	1.9	1.8	1.6	2.0	15.31
Households without Children	87.7	4.2	7.1	9.2	8.0	12.8	9.6	10.0	8.7	18.1	5.44
One Adult	19.8	1.0	1.5	1.7	1.6	3.4	2.4	2.1	1.8	4.4	11.71
Age of Householder											
Under 35 Years	5.7	.5	.7	Q	.6	.9	.6	.6	Q	.9	22.34
35 to 59 Years	7.1	Q	Q	.6	Q	1.2	1.0	.7	.6	1.8	22.54
60 Years or More	7.0	Q	Q	Q	Q	1.3	.8	.8	.7	1.7	18.21
Two or More Adults	67.9	3.2	5.6	7.5	6.5	9.4	7.2	7.9	6.9	13.8	6.22
Age of Householder											
Under 35 Years	14.3	.8	1.5	2.0	1.7	1.8	1.8	1.3	1.2	2.3	13.42
35 to 59 Years	29.4	1.2	2.7	3.1	2.7	4.1	3.3	3.7	2.9	5.8	9.36
60 Years or More	24.2	1.2	1.4	2.4	2.1	3.5	2.2	2.9	2.7	5.6	11.17
Origin of Householder											
White	132.2	6.5	10.9	14.0	11.8	19.7	14.6	14.7	13.8	26.2	4.38
Black	10.6	.4	.8	.8	.9	1.2	1.3	1.7	1.4	2.1	18.05
Other	4.7	Q	Q	.7	.4	.5	.7	.6	Q	.9	27.02
Hispanic Descent											
Yes	7.6	.3	.5	.7	.7	1.0	.9	.8	.9	1.8	20.81
No	139.9	6.8	11.4	14.8	12.4	20.4	15.6	16.3	14.8	27.4	3.94

See footnote at end of table

Table 9. U.S. Vehicles by Model Year, 1988 (Continued)
(Million Vehicles)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor	0.289	1.408	1.318	1.378	1.185	0.911	1.071	1.043	1.124	0.905	
1987 Family Income											
Less than \$10,000	13.3	0.4	0.6	0.6	0.7	1.8	1.2	1.7	2.0	4.4	16.79
\$10,000 to \$14,999	17.0	.4	1.0	1.1	1.1	1.7	2.1	1.9	2.6	5.1	14.09
\$15,000 to \$19,999	13.3	.9	.9	.8	1.2	2.1	1.8	1.9	1.1	2.7	14.21
\$20,000 to \$24,999	15.1	.5	1.0	1.9	1.5	2.2	1.5	2.2	1.6	2.8	13.82
\$25,000 to \$34,999	29.2	1.3	2.3	3.1	2.4	4.0	3.3	4.2	2.9	5.8	9.42
\$35,000 to \$49,999	28.3	1.4	2.6	3.7	2.8	4.7	3.2	2.8	3.1	4.0	9.80
\$50,000 to \$74,999	20.5	1.4	2.2	2.7	2.4	3.5	2.3	1.5	1.4	2.9	11.23
\$75,000 or More	10.8	.8	1.4	1.6	1.1	1.4	1.1	.9	1.0	1.5	17.85
Below 100% of Poverty	9.4	.3	Q	Q	.5	1.0	.7	1.3	1.8	3.2	16.00
Below 125% of Poverty	16.3	.5	.7	.9	.8	1.9	1.4	2.2	2.7	5.2	14.57
Number of Drivers (fall 1987)											
1	28.7	1.2	2.1	2.4	2.0	4.3	3.5	2.8	3.2	7.1	10.23
2	83.3	4.4	6.8	9.1	7.7	12.4	8.9	9.9	8.3	15.8	5.30
3	21.4	.8	1.8	2.4	2.2	2.9	2.5	2.4	2.6	3.8	11.57
4 or More	13.2	.7	1.1	1.5	1.2	1.6	1.5	1.7	1.5	2.3	15.74
Average Number of Vehicles per Household per year											
Part-Year Vehicle	2.1	Q	Q	Q	Q	.3	.3	Q	.3	.6	27.12
Only 1	24.5	1.1	2.1	2.6	2.1	4.3	3.1	2.2	2.6	4.3	9.96
Between 1 and 2	13.7	1.1	1.3	1.1	1.1	1.8	1.6	1.7	1.6	2.5	13.17
Only 2	48.7	1.7	4.3	6.1	4.9	7.9	5.4	5.4	4.7	8.3	7.46
Between 2 and 3	19.9	1.4	1.3	1.8	2.0	2.5	2.2	2.8	2.0	4.0	10.34
Only 3	17.6	.9	1.3	1.7	1.4	2.5	1.7	2.1	2.1	4.0	14.05
Between 3 and 4	9.5	.4	.7	.9	.9	1.2	.7	1.2	1.2	2.2	17.68
4 or More	11.4	.5	.8	1.0	.6	1.0	1.5	1.4	1.3	3.3	18.14
Vehicle Characteristics											
Type of Vehicle											
Passenger Car	109.3	5.3	8.4	11.3	9.9	17.1	13.1	13.4	11.7	19.1	4.57
Mini Van	2.2	.3	.5	.6	.4	Q	NC	NC	NC	Q	20.97
Jeep-Like Vehicle	4.8	Q	.8	.8	.5	.8	Q	.4	Q	.7	21.55
Large Van	4.7	Q	Q	Q	Q	.6	Q	.6	.9	1.3	19.68
Pickup Truck	25.9	1.0	2.1	2.3	2.1	2.6	2.7	2.6	2.7	7.7	9.60
Other .....	.7	Q	NC	Q	Q	Q	NC	Q	Q	Q	55.80
Fuel Efficiency (miles per gallon)											
10.9 or Less	15.7	Q	Q	Q	Q	Q	Q	1.5	2.6	10.7	9.58
11 to 12.9	12.5	Q	Q	Q	Q	.7	Q	2.1	2.6	5.8	12.44
13 to 15.9	24.3	.5	.7	1.3	.9	2.6	1.7	4.6	5.7	6.4	11.41
16 to 18.9	24.2	.7	1.1	2.0	2.7	4.3	3.8	4.0	2.5	3.1	10.66
19 to 21.9	26.0	1.9	3.5	4.5	3.2	4.4	4.0	1.9	.7	1.8	10.05
22 or More	44.1	3.8	6.5	7.5	5.8	9.1	6.0	2.8	1.4	1.1	7.57
Engine Size (Liters)											
2.49 or Less	49.4	2.7	5.9	6.5	5.9	9.2	7.3	5.0	2.5	4.3	6.89
2.50 to 3.49	21.7	2.0	3.2	4.3	2.5	3.6	2.4	1.5	1.0	1.3	10.52
3.50 to 4.49	21.3	1.0	.9	1.7	1.7	3.3	3.3	3.4	2.4	3.7	10.87
4.50 or Greater	55.2	1.5	1.9	3.1	3.1	5.3	3.5	7.2	9.8	19.8	7.49
Number of Cylinders											
4	55.3	3.4	6.9	8.0	6.8	10.1	8.0	5.1	2.7	4.2	6.41
6	36.0	2.2	3.1	4.4	3.2	5.9	4.7	4.0	3.1	5.4	7.90
8	55.2	1.4	1.7	2.9	3.0	5.2	3.7	7.8	9.9	19.5	7.49
Other	1.0	Q	Q	Q	Q	Q	Q	Q	NC	Q	41.13

See footnote at end of table

Table 9. U.S. Vehicles by Model Year, 1988 (Continued)
(Million Vehicles)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor:	0.398	1.409	1.318	1.118	1.165	0.911	1.071	1.043	1.124	0.905	
Type of Transmission											
Automatic	105.6	5.4	8.0	11.2	9.7	14.9	10.7	11.7	12.9	21.0	4.58
Manual Shift	41.9	1.7	3.9	4.2	3.4	6.4	5.8	5.4	2.9	8.1	7.66
Type of Drive											
Front-Wheel	47.9	4.7	6.6	8.2	7.1	9.3	6.5	3.0	1.3	1.2	7.25
Rear-Wheel	89.1	1.8	3.9	5.9	4.7	10.6	9.3	12.8	13.5	26.5	5.64
4-Wheel	10.4	.6	1.4	1.4	1.4	1.4	.7	1.2	.9	1.4	14.74
Type of Fuel System											
Carburetor	111.5	2.9	5.9	9.7	7.1	14.9	13.0	15.1	14.7	28.2	4.78
Fuel Injection	33.9	4.3	6.0	5.7	6.0	5.9	2.9	1.3	.9	8	9.19
Diesel Engine	2.1	NC	NC	Q	Q	.5	.6	.6	Q	Q	25.08
Type of Fuel Purchased											
Motor Gasoline	145.1	7.1	11.9	15.4	13.1	20.9	15.8	16.4	15.5	28.9	3.85
Unleaded	125.2	7.0	11.7	15.0	13.0	20.4	15.2	15.4	13.0	14.5	4.20
Regular Grade	80.7	4.0	7.2	8.9	7.6	13.1	9.7	10.3	8.7	11.1	5.32
Intermediate Grade	7.7	.6	.8	1.1	.7	1.3	.8	.9	1.0	.5	17.88
Premium Grade	36.9	2.5	3.7	5.1	4.6	6.0	4.7	4.2	3.3	2.8	8.32
Leaded	19.9	Q	Q	Q	Q	.5	.6	1.0	2.5	14.4	12.83
Diesel Fuel	2.1	NC	NC	Q	Q	.5	.6	.6	Q	Q	25.08
Type of Primary Service											
Full-Service Pumps	22.3	1.0	2.1	2.5	2.1	3.6	2.5	2.7	2.2	3.7	12.18
Self or Mini-Service Pumps	119.5	5.8	9.3	12.6	10.3	16.8	13.7	13.9	12.8	24.4	4.41
Both Equally	5.5	Q	.5	Q	.8	1.0	Q	.4	.7	1.0	23.77
Vehicle Used on the Job											
Yes	17.1	1.1	1.9	2.5	1.6	2.6	2.0	1.8	1.4	2.2	10.99
No	130.4	6.0	10.1	13.0	11.5	18.8	14.5	15.2	14.3	27.0	4.05

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 10. U.S. Vehicle Fuel Efficiency by Model Year, 1988
(Miles per Gallon)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor:	0.534	1.138	1.017	0.998	1.037	0.849	0.937	1.269	1.141	1.359	
Household Characteristics											
Total	18.3	22.1	22.9	21.9	21.2	20.9	20.7	16.6	14.5	12.3	1.5
Census Region and Division											
Northeast	19.6	21.5	23.3	22.3	22.6	21.3	21.8	16.6	15.2	12.2	2.9
New England	19.7	Q	22.6	22.6	21.7	19.4	20.7	18.8	15.7	Q	5.7
Middle Atlantic	19.6	21.6	23.6	22.2	22.9	21.9	22.1	16.0	15.0	12.0	3.1
Midwest	18.2	23.0	22.0	21.5	21.5	20.4	20.7	16.7	14.6	12.2	2.6
East North Central	18.4	22.7	21.6	21.5	21.7	19.9	21.0	17.4	14.8	11.9	3.1
West North Central	17.8	24.0	22.9	21.8	21.0	21.2	20.2	15.2	14.1	12.6	4.5
South	18.0	21.9	23.0	21.8	20.7	20.7	19.7	16.3	14.4	12.0	2.7
South Atlantic	19.0	22.5	23.7	21.9	20.7	21.4	21.2	17.3	14.6	12.4	3.6
East South Central	17.6	Q	23.2	22.7	Q	21.2	19.9	16.4	14.8	11.2	4.7
West South Central	16.8	20.8	21.5	21.1	20.0	18.8	18.0	15.2	13.8	12.1	5.0
West	18.0	22.3	23.6	22.3	20.4	21.8	21.5	17.0	14.4	12.7	3.9
Mountain	17.7	Q	23.8	23.4	19.9	21.7	21.8	16.4	14.2	12.8	7.1
Pacific	18.0	22.3	23.6	22.0	20.6	21.8	21.5	17.2	14.4	12.6	4.6
Metropolitan Status											
Metropolitan	18.7	22.2	23.1	22.0	21.2	21.2	20.9	16.7	14.7	12.5	1.7
Central City	18.4	23.1	23.6	22.1	21.8	21.8	20.4	16.5	14.4	12.5	3.1
Outside Central City	18.8	22.0	22.9	21.9	20.9	20.9	21.1	16.8	14.8	12.6	2.1
Nonmetropolitan	17.2	21.8	22.1	21.8	21.3	20.0	20.1	16.3	14.1	11.7	3.2
Household Size											
1 Person	18.4	21.6	25.5	22.6	22.3	21.6	20.7	15.8	14.5	12.2	4.6
2 Persons	18.1	21.5	22.4	21.4	20.6	20.3	21.0	16.2	14.6	12.1	2.6
3 Persons	18.8	23.1	22.9	22.4	22.4	22.1	20.7	16.8	14.4	12.5	3.3
4 Persons	18.6	21.9	22.8	22.3	20.8	21.4	20.4	16.8	14.6	12.6	3.0
5 or More Persons	17.9	23.1	22.4	21.7	20.8	19.8	20.1	17.3	14.4	12.0	4.2
Household Composition											
Households with Children	18.5	22.6	22.9	22.1	21.2	21.3	20.5	17.3	14.8	12.2	2.2
Age of Oldest Child											
Under 7 Years	19.1	22.4	24.1	22.7	23.0	22.4	21.7	17.7	15.1	12.2	4.7
7 to 15 Years	17.9	21.5	22.1	21.9	20.6	20.4	19.7	17.3	14.6	12.1	3.2
16 or 17 Years	19.0	24.3	22.9	21.8	20.8	21.9	20.6	16.9	14.8	12.7	4.3
Households without Children	18.2	21.7	23.0	21.8	21.2	20.6	20.8	16.0	14.3	12.3	2.0
One Adult	18.4	21.6	25.5	22.6	22.3	21.6	20.7	15.8	14.5	12.2	4.6
Age of Householder											
Under 35 Years	20.3	Q	Q	Q	Q	Q	Q	Q	Q	Q	8.7
35 to 59 Years	18.1	Q	Q	Q	Q	22.4	18.9	Q	Q	12.4	7.5
60 Years or More	16.7	Q	Q	Q	Q	18.2	Q	Q	Q	10.9	6.3
Two or More Adults	18.1	21.7	22.4	21.7	20.9	20.3	20.8	16.1	14.3	12.4	2.2
Age of Householder											
Under 35 Years	19.7	22.1	23.8	22.9	22.1	22.3	22.3	17.5	14.4	12.7	5.9
35 to 59 Years	18.0	22.1	21.6	21.1	20.8	20.2	20.5	16.3	14.3	12.8	3.8
60 Years or More	17.1	21.0	22.4	21.3	20.0	19.4	19.8	15.1	14.1	11.5	3.3
Origin of Householder											
White	18.3	22.1	22.8	21.8	21.1	20.8	20.7	16.6	14.4	12.3	1.6
Black	18.5	Q	24.4	Q	23.0	Q	19.5	16.0	15.9	12.0	5.1
Other	18.6	Q	Q	Q	Q	Q	Q	Q	Q	Q	15.6
Hispanic Descent											
Yes	17.8	Q	Q	Q	Q	20.8	Q	Q	Q	12.1	11.4
No	18.4	22.2	22.9	21.9	21.3	20.9	20.7	16.6	14.5	12.3	1.5

See footnote at end of table

Table 10. U.S. Vehicle Fuel Efficiency by Model Year, 1988 (Continued)
(Miles per Gallon)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor	0.534	1.136	1.017	0.898	1.037	0.849	0.937	1.288	1.141	1.359	
1987 Family Income											
Less than \$10,000	16.8	Q	Q	Q	Q	21.6	21.6	16.5	14.8	12.2	5.1
\$10,000 to \$14,999	17.0	Q	25.5	23.1	22.8	22.0	20.0	16.4	15.3	11.9	5.0
\$15,000 to \$19,999	18.0	22.4	24.8	22.1	19.8	21.3	20.6	15.7	14.7	12.4	5.7
\$20,000 to \$24,999	18.2	22.8	23.6	22.8	21.0	20.3	20.6	17.1	13.8	11.9	4.8
\$25,000 to \$34,999	18.2	21.3	23.4	22.1	21.0	21.4	19.8	16.4	14.2	12.6	3.1
\$35,000 to \$49,999	19.0	22.9	22.9	21.4	21.3	20.7	21.2	16.9	14.2	12.0	3.6
\$50,000 to \$74,999	19.2	21.2	21.1	21.8	20.8	20.3	21.0	16.2	14.8	12.7	3.8
\$75,000 or More	19.7	23.0	22.7	21.5	22.0	21.1	21.5	18.5	14.6	13.0	5.1
Below 100% of Poverty	16.3	Q	Q	Q	Q	21.5	Q	Q	14.0	12.3	5.3
Below 125% of Poverty	16.7	Q	Q	22.3	Q	21.8	20.0	17.0	14.7	12.3	4.6
Number of Drivers (fall 1987)											
1	18.3	21.5	25.4	23.0	22.3	21.8	20.4	16.5	15.0	12.2	3.8
2	18.3	21.9	22.7	21.6	20.8	20.7	20.8	16.6	14.4	12.2	2.0
3	18.3	23.3	21.9	21.7	21.7	20.9	20.6	16.3	14.3	12.1	3.9
4 or More	19.1	23.4	22.6	22.8	21.3	21.2	20.6	17.1	14.6	13.7	4.1
Average Number of Vehicles per Household per year											
Part-Year Vehicle	16.7	Q	Q	Q	Q	Q	Q	Q	Q	Q	10.6
Only 1	19.3	23.5	24.6	23.7	22.5	22.0	22.0	16.4	15.1	12.5	3.6
Between 1 and 2	18.2	20.8	24.5	21.7	20.8	21.4	20.4	16.9	14.7	12.1	5.1
Only 2	18.4	21.2	21.9	22.0	20.8	20.7	20.2	16.5	14.7	11.7	2.6
Between 2 and 3	18.4	22.3	23.6	20.1	22.4	20.9	20.8	17.4	14.2	12.9	4.0
Only 3	18.0	21.7	21.9	22.2	20.5	20.4	19.9	15.5	14.0	12.7	4.2
Between 3 and 4	17.7	Q	Q	21.2	21.8	19.9	20.6	16.9	14.3	12.3	5.6
4 or More	17.6	23.6	23.0	21.9	Q	20.2	20.7	16.7	13.9	12.7	5.9
Vehicle Characteristics											
Type of Vehicle											
Passenger Car	19.7	24.1	24.9	23.9	23.2	22.3	21.7	17.8	15.5	12.8	1.5
Mini Van	19.4	Q	Q	19.6	Q	Q	NC	NC	NC	Q	2.4
Jeep-Like Vehicle	15.4	Q	19.3	Q	Q	14.4	Q	Q	Q	Q	6.4
Large Van	13.1	Q	Q	Q	Q	15.2	Q	Q	11.2	11.2	4.6
Pickup Truck	15.3	17.5	19.2	18.4	17.2	18.8	18.0	13.3	13.0	11.5	3.4
Other	8.3	Q	NC	Q	Q	Q	NC	Q	Q	Q	11.0
Engine Size (liters)											
2.49 or Less	25.3	26.8	26.8	26.4	26.1	26.7	25.4	22.9	22.6	19.3	1.9
2.50 to 3.49	20.4	22.3	21.5	21.4	20.7	20.8	20.3	18.7	16.2	13.7	2.2
3.50 to 4.49	17.8	20.4	21.2	20.4	19.7	19.0	18.4	16.5	16.1	13.6	1.9
4.50 or Greater	13.6	17.1	17.6	17.0	16.2	15.8	16.0	13.5	13.0	11.0	2.2
Number of Cylinders											
4	24.9	26.2	25.8	25.7	25.9	26.1	25.2	22.8	22.0	19.0	1.8
6	18.5	20.7	21.1	20.2	19.1	19.4	19.0	16.7	16.0	14.0	1.8
8	13.7	17.1	17.5	17.1	16.3	15.9	16.1	13.9	13.1	11.0	2.2
Other	23.4	Q	Q	Q	Q	Q	Q	Q	NC	NC	12.6
Type of Transmission											
Automatic	17.1	21.4	21.8	20.9	20.2	19.5	19.1	15.3	13.8	11.6	1.5
Manual Shift	22.0	24.6	25.4	25.1	24.4	24.8	24.3	19.8	18.5	14.9	3.2
Type of Drive											
Front-Wheel	23.9	24.6	25.6	25.1	24.0	24.9	24.1	21.6	18.6	12.4	2.5
Rear-Wheel	16.1	19.0	20.6	19.5	19.4	19.0	19.1	16.1	14.4	12.4	2.0
4-Wheel	15.6	16.8	19.5	18.7	15.8	16.3	16.7	13.0	12.2	10.3	4.7

See footnote at end of table

Table 10. U.S. Vehicle Fuel Efficiency by Model Year, 1988 (Continued)
(Miles per Gallon)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor:	0.534	1.136	1.017	0.998	1.037	0.849	0.937	1.288	1.141	1.359	
Type of Fuel System											
Carburetor	17.2	22.8	23.1	21.8	20.2	20.5	20.1	16.2	14.5	12.1	2.0
Fuel Injection	21.8	21.7	22.9	22.2	22.6	22.1	21.9	18.3	14.9	Q	2.6
Diesel Engine	21.5	NC	NC	Q	Q	22.1	28.0	Q	Q	Q	10.5
Type of Fuel Purchased											
Motor Gasoline	18.3	22.1	23.0	22.0	21.3	20.9	20.5	16.4	14.6	12.3	1.5
Unleaded	19.1	22.2	23.1	22.1	21.3	21.0	20.4	16.5	14.9	12.4	1.6
Regular Grade	18.9	22.2	23.2	22.0	21.5	21.3	20.4	16.7	14.7	12.3	2.0
Intermediate Grade	19.6	Q	23.2	21.5	21.9	20.6	21.3	17.3	Q	Q	5.2
Premium Grade	19.6	22.3	22.9	22.4	21.0	20.7	20.2	16.1	14.9	13.3	2.7
Leaded	13.1	Q	Q	Q	Q	Q	Q	14.4	13.2	12.1	4.2
Diesel Fuel	21.5	NC	NC	Q	Q	22.1	28.0	Q	Q	Q	10.5
Type of Primary Service											
Full-Service Pumps	19.1	22.1	22.9	23.1	21.8	20.2	21.2	16.8	15.6	12.4	3.8
Self or Mini-Service Pumps	18.2	22.2	23.0	21.8	21.2	21.0	20.6	16.5	14.4	12.3	1.7
Both Equally	18.3	Q	Q	Q	19.9	22.4	Q	Q	Q	Q	7.0
Vehicle Used on the Job											
Yes	18.5	21.1	22.9	21.8	19.6	19.8	19.7	16.4	13.8	11.6	4.3
No	18.3	22.4	23.0	22.0	21.5	21.1	20.8	16.6	14.6	12.4	1.6

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 11. U.S. Average Vehicle Fuel Consumption by Vehicle Model Year, 1988
(Gallons per Vehicle)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor	0.426	1.326	0.967	0.941	0.984	0.980	0.927	1.206	1.323	1.552	
Household Characteristics											
Total	559	583	584	573	569	533	502	572	600	550	3.48
Census Region and Division											
Northeast	525	582	569	507	569	488	489	525	532	530	7.36
New England	517	Q	625	486	485	535	506	484	503	Q	13.71
Middle Atlantic	528	574	545	515	599	473	485	538	543	556	8.21
Midwest	550	531	586	586	527	569	475	571	573	534	5.62
East North Central	550	519	621	575	524	575	450	566	579	538	7.10
West North Central	550	577	510	633	533	558	524	579	559	529	6.71
South	585	607	619	603	583	542	531	609	630	580	6.40
South Atlantic	563	600	634	594	568	528	510	544	608	544	7.98
East South Central	590	Q	569	585	Q	494	481	613	675	636	12.32
West South Central	619	591	622	632	607	607	585	689	628	599	11.91
West	556	620	544	574	607	525	497	550	634	538	7.47
Mountain	558	Q	532	534	746	533	520	547	639	511	10.76
Pacific	555	641	549	589	558	524	490	551	632	548	9.09
Metropolitan Status											
Metropolitan	550	579	597	567	548	524	487	565	583	541	3.83
Central City	529	510	522	547	530	500	483	561	568	528	6.36
Outside Central City	561	604	632	577	556	535	489	567	592	549	4.70
Nonmetropolitan	588	600	522	602	651	570	553	592	656	572	6.82
Household Size											
1 Person	501	539	503	463	535	441	494	537	521	519	10.28
2 Persons	518	537	545	535	565	501	479	543	539	479	6.20
3 Persons	596	583	624	608	543	552	503	604	675	654	7.11
4 Persons	593	671	649	649	573	573	526	526	678	574	6.27
5 or More Persons	618	637	604	614	644	654	533	675	605	609	7.49
Household Composition											
Households with Children	609	658	624	627	607	585	535	615	646	615	4.26
Age of Oldest Child											
Under 7 Years	592	652	624	573	571	563	526	552	583	667	8.70
7 to 15 Years	611	633	633	643	595	616	549	617	661	580	6.46
16 or 17 Years	625	702	604	673	673	551	522	676	685	627	9.59
Households without Children	525	530	556	537	545	499	479	541	562	511	4.97
One Adult	501	539	503	463	535	441	494	537	521	519	10.28
Age of Householder											
Under 35 Years	592	Q	Q	Q	Q	Q	Q	Q	Q	Q	15.14
35 to 59 Years	514	Q	Q	Q	Q	490	556	Q	Q	537	16.32
60 Years or More	413	Q	Q	Q	Q	345	Q	Q	Q	424	16.48
Two or More Adults	532	528	571	553	548	520	475	542	573	508	5.41
Age of Householder											
Under 35 Years	578	609	622	586	573	544	509	525	670	595	10.74
35 to 59 Years	567	524	601	594	570	565	495	604	586	555	7.63
60 Years or More	460	475	460	473	500	456	416	471	516	425	8.58
Origin of Householder											
White	556	583	580	575	565	533	496	569	599	545	3.59
Black	581	Q	640	Q	600	Q	586	605	566	574	11.90
Other	585	Q	Q	Q	Q	Q	Q	Q	Q	Q	21.53
Hispanic Descent											
Yes	588	Q	Q	Q	Q	576	Q	Q	Q	541	15.05
No	557	574	577	574	571	531	505	570	593	551	3.46

See footnote at end of table

Table 11. U.S. Average Vehicle Fuel Consumption by Vehicle Model Year, 1988 (Continued)
(Gallons per Vehicle)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor:	0.428	1.328	0.967	0.841	0.884	0.880	0.927	1.208	1.323	1.552	
1987 Family Income											
Less than \$10,000	500	Q	Q	Q	Q	416	512	503	531	518	13.82
\$10,000 to \$14,999	532	Q	523	475	518	432	446	577	583	575	11.17
\$15,000 to \$19,999	549	446	487	625	601	483	490	617	611	574	13.54
\$20,000 to \$24,999	561	530	563	535	549	578	499	563	599	583	8.14
\$25,000 to \$34,999	560	628	565	530	551	528	539	566	620	564	7.24
\$35,000 to \$49,999	583	598	629	616	601	562	500	597	643	541	6.63
\$50,000 to \$74,999	574	624	640	631	571	592	501	588	560	485	7.78
\$75,000 or More	585	688	591	573	621	583	522	540	638	556	12.86
Below 100% of Poverty	540	Q	Q	Q	Q	503	Q	Q	564	532	12.66
Below 125% of Poverty	543	Q	Q	544	Q	451	505	554	565	568	10.39
Number of Drivers (fall 1987)											
1	501	540	505	478	511	450	491	539	542	500	8.83
2	561	575	585	567	584	541	498	562	595	563	4.48
3	604	571	651	678	534	582	525	628	664	598	9.04
4 or More	605	703	623	611	647	631	526	601	657	546	8.70
Average Number of Vehicles per Household per year											
Part-Year Vehicle	572	Q	Q	Q	Q	Q	Q	Q	Q	Q	37.13
Only 1	526	529	526	480	548	478	486	553	551	591	9.06
Between 1 and 2	618	559	597	573	628	557	605	604	682	692	11.12
Only 2	550	589	602	553	578	537	479	545	617	519	5.41
Between 2 and 3	571	593	566	663	552	552	478	547	607	597	8.60
Only 3	538	536	657	623	567	543	513	603	527	432	10.03
Between 3 and 4	606	Q	Q	635	534	626	577	657	675	568	11.66
4 or More	564	726	570	661	Q	557	497	595	588	506	10.92
Vehicle Characteristics											
Type of Vehicle											
Passenger Car	526	531	547	515	526	491	489	536	564	548	3.74
Mini Van	653	Q	Q	767	Q	Q	NC	NC	NC	Q	13.55
Jeep-Like Vehicle	767	Q	750	Q	Q	907	Q	Q	Q	Q	16.10
Large Van	747	Q	Q	Q	Q	829	Q	Q	795	578	11.90
Pickup Truck	615	710	645	715	691	621	516	635	666	550	8.44
Other	584	Q	NC	Q	Q	Q	NC	Q	Q	Q	72.80
Fuel Efficiency (miles per gallon)											
10.9 or Less	606	Q	Q	Q	Q	Q	Q	520	639	625	10.40
11 to 12.9	640	Q	Q	Q	Q	735	Q	661	671	594	10.89
13 to 15.9	611	Q	Q	722	897	558	572	628	605	556	10.24
16 to 18.9	576	743	542	604	542	614	551	607	677	415	8.37
19 to 21.9	579	627	648	639	617	578	522	488	Q	463	6.60
22 or More	477	524	540	495	493	452	450	467	364	276	5.74
Engine Size (liters)											
2.49 or Less	447	492	509	482	467	427	421	440	371	389	5.38
2.50 to 3.49	561	607	609	594	586	556	479	454	502	544	8.10
3.50 to 4.49	542	604	583	577	618	540	566	555	531	444	8.85
4.50 or Greater	664	703	778	734	723	698	631	696	686	605	6.19
Number of Cylinders											
4	453	507	506	493	472	435	410	432	387	403	5.16
6	570	632	680	618	632	573	561	557	512	451	6.15
8	659	699	744	734	723	677	628	672	685	610	6.55
Other	485	Q	Q	Q	Q	Q	Q	Q	NC	NC	34.12

See footnote at end of table

Table 11. U.S. Average Vehicle Fuel Consumption by Vehicle Model Year, 1988 (Continued)
(Gallons per Vehicle)

Household and Vehicle Characteristics	All Model Years	Model Year									RSE Row Factor
		1989 or 1988	1987	1986	1985	1984 or 1983	1982 or 1981	1980 or 1979	1978 or 1977	1976 or Earlier	
RSE Column Factor:	0.426	1.326	0.967	0.941	0.984	0.860	0.927	1.208	1.323	1.552	
Type of Transmission											
Automatic	590	599	602	597	585	553	545	605	627	600	3.98
Manual Shift	480	536	549	511	524	489	423	500	480	421	6.01
Type of Drive											
Front-Wheel	494	527	524	491	525	453	435	473	517	695	5.74
Rear-Wheel	579	665	649	663	591	574	544	578	607	543	4.77
4-Wheel	683	792	683	679	729	759	568	756	617	563	12.42
Type of Fuel System											
Carburetor	558	556	551	568	593	541	511	572	601	550	4.59
Fuel Injection	562	602	618	578	536	519	478	582	582	Q	5.89
Diesel Engine	519	NC	NC	Q	Q	496	432	Q	Q	Q	17.47
Type of Fuel Purchased											
Motor Gasoline	559	583	584	572	567	534	504	573	597	550	3.46
Unleaded	558	585	582	568	564	532	502	568	589	568	3.65
Regular Grade	558	603	573	558	572	529	493	571	604	567	4.51
Intermediate Grade	577	Q	629	611	522	614	487	559	Q	Q	12.87
Premium Grade	554	543	590	575	558	521	523	563	580	556	6.55
Leaded	561	Q	Q	Q	Q	Q	Q	647	636	532	8.87
Diesel Fuel	519	NC	NC	Q	Q	496	432	Q	Q	Q	17.47
Type of Primary Service											
Full-Service Pumps	496	467	564	490	534	502	454	482	490	482	9.38
Self or Mini-Service Pumps	570	601	588	589	574	544	513	591	615	560	3.67
Both Equally	563	Q	Q	Q	598	472	Q	Q	Q	Q	14.98
Vehicle Used on the Job											
Yes	669	724	648	642	763	636	599	711	689	673	9.00
No	544	558	573	560	542	519	489	555	591	540	3.65

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 12. U.S. Vehicle Miles Traveled by Family Income, 1988
(Billion Miles)

Household and Vehicle Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor:	0.369	1.308	1.167	1.298	1.209	0.844	0.814	0.936	1.526	
Household Characteristics										
Total	1,511	111	153	132	154	297	313	226	124	7.06
Census Region and Division										
Northeast	274	14	21	15	28	52	66	43	36	14.15
New England	67	Q	Q	Q	9	15	17	10	8	30.62
Middle Atlantic	208	12	17	13	19	37	49	32	29	15.32
Midwest	379	25	42	41	41	73	84	53	19	13.40
East North Central	263	18	32	26	26	50	59	41	11	16.76
West North Central	115	Q	10	15	15	23	25	12	Q	19.92
South	534	48	64	52	59	110	100	68	33	13.53
South Atlantic	277	21	29	30	33	48	56	36	25	19.81
East South Central	98	Q	14	Q	8	28	18	7	Q	27.25
West South Central	159	18	21	14	18	34	26	25	Q	22.88
West	325	24	27	23	27	62	63	62	36	12.50
Mountain	84	10	Q	10	Q	17	13	12	Q	20.89
Pacific	241	14	18	14	19	45	50	50	31	14.84
Metropolitan Status										
Metropolitan	1,171	73	99	90	106	234	250	202	116	8.08
Central City	376	33	48	29	40	90	60	57	19	14.23
Outside Central City	794	40	51	61	66	143	190	144	98	10.45
Nonmetropolitan	341	38	54	42	48	64	63	25	8	14.87
Household Size										
1 Person	183	37	35	23	19	42	16	Q	Q	16.53
2 Persons	481	38	58	44	46	91	94	76	34	12.12
3 Persons	322	15	25	24	33	69	75	60	22	16.60
4 Persons	295	11	18	21	31	50	68	63	32	18.03
5 or More Persons	230	Q	16	20	25	46	60	21	31	20.75
Household Composition										
Households with Children	674	34	55	58	75	134	159	93	67	12.19
Age of Oldest Child										
Under 7 Years	196	12	Q	18	22	43	49	29	Q	19.17
7 to 15 Years	314	19	29	29	37	68	67	40	24	16.70
16 or 17 Years	164	Q	11	11	16	23	43	24	35	24.50
Households without Children	837	77	99	74	80	164	154	133	57	9.33
One Adult	183	37	35	23	19	42	16	Q	Q	16.53
Age of Householder										
Under 35 Years	69	Q	Q	12	Q	16	Q	Q	Q	28.85
35 to 59 Years	66	Q	10	Q	Q	21	Q	Q	Q	30.32
60 Years or More	48	19	13	5	Q	Q	Q	Q	Q	22.52
Two or More Adults	654	41	64	51	60	122	139	126	52	10.95
Age of Householder										
Under 35 Years	164	11	Q	16	16	40	39	24	Q	21.99
35 to 59 Years	300	16	15	16	20	41	74	79	39	17.53
60 Years or More	190	13	36	18	24	41	25	23	9	17.86
Origin of Householder										
White	1,346	87	131	119	135	268	282	207	117	7.63
Black	115	21	16	Q	13	24	19	10	Q	29.94
Other	51	Q	Q	Q	7	Q	12	Q	Q	43.66
Hispanic Descent										
Yes	79	Q	Q	Q	Q	Q	22	8	Q	38.24
No	1,432	107	144	124	147	285	291	218	115	7.20
Number of Drivers (fall 1987)										
1	262	53	53	36	30	55	22	Q	Q	13.67
2	854	48	81	72	90	183	192	130	59	9.88
3	237	Q	15	17	22	45	55	53	25	20.09
4 or More	152	Q	Q	Q	13	14	44	33	35	26.10

See footnote at end of table

Table 12. U.S. Vehicle Miles Traveled by Family Income, 1988 (Continued)
(Billion Miles)

Household and Vehicle Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor:	0.369	1.508	1.167	1.298	1.209	0.844	0.814	0.936	1.526	
Average Number of Vehicles per Household per year										
Part-Year Vehicle	20	Q	Q	Q	Q	Q	Q	Q	NC	71.89
Only 1	249	51	51	34	31	45	22	Q	Q	13.86
Between 1 and 2	155	16	21	21	16	35	23	14	Q	22.36
Only 2	492	24	41	33	53	109	121	75	36	12.51
Between 2 and 3	209	Q	13	18	18	55	42	40	14	19.50
Only 3	170	Q	11	16	17	19	38	40	26	24.07
Between 3 and 4	102	Q	Q	Q	Q	11	37	26	10	28.83
4 or More	113	Q	Q	Q	7	18	28	21	26	32.72
Vehicle Characteristics										
Model Year										
1988 or 1988	92	Q	Q	9	6	18	19	19	12	21.82
1987	160	Q	14	11	13	30	38	30	19	19.50
1986	195	Q	12	12	23	36	50	37	20	18.26
1985	159	Q	13	14	17	28	36	29	14	18.38
1984	153	Q	11	16	17	27	35	30	10	17.27
1983	86	8	Q	Q	9	18	20	13	Q	22.71
1982	87	Q	10	11	8	18	15	14	Q	21.76
1981	84	Q	Q	8	8	18	19	10	Q	25.45
1979 or 1980	161	14	18	18	21	39	28	15	9	17.94
1977 or 1978	137	16	23	10	13	25	28	12	9	18.33
1975 or 1976	76	10	12	10	8	16	10	8	Q	25.49
1974 or Earlier	121	18	24	9	12	25	16	10	Q	23.19
Type of Vehicle										
Passenger Car	1,134	87	120	96	116	217	226	170	101	7.81
Mini Van	28	Q	Q	Q	Q	Q	8	Q	Q	36.55
Jeep-Like Vehicle	56	Q	Q	Q	Q	14	12	13	Q	28.82
Large Van	46	Q	Q	Q	Q	9	13	Q	Q	30.82
Pickup Truck	244	18	26	25	27	52	53	32	11	15.42
Other	3	Q	Q	Q	Q	Q	Q	Q	NC	95.61
Fuel Efficiency (miles per gallon)										
10.9 or Less	88	11	15	8	9	16	16	7	Q	19.83
11 to 12.9	96	10	11	7	12	23	16	12	Q	22.38
13 to 15.9	216	22	28	25	22	42	38	27	12	15.68
16 to 18.9	243	18	26	19	25	50	50	39	16	14.55
19 to 21.9	307	17	22	25	28	56	66	57	35	14.97
22 or More	561	33	51	47	58	110	127	84	51	10.91
Engine Size (liters)										
2.49 or Less	558	36	52	48	56	111	123	81	51	11.05
2.50 to 3.49	248	10	22	18	24	45	55	48	27	14.83
3.50 to 4.49	205	20	20	22	21	41	40	27	15	15.60
4.50 or Greater	501	44	60	44	54	101	96	69	32	11.95
Number of Cylinders										
4	623	39	58	52	63	126	138	92	55	10.48
6	380	29	36	35	35	69	81	63	32	12.16
8	497	43	59	45	56	99	92	69	34	11.74
Other	11	Q	Q	Q	Q	Q	Q	Q	Q	72.83
Type of Transmission										
Automatic	1,068	81	111	93	111	210	222	155	86	7.95
Manual Shift	443	30	42	39	43	87	91	71	38	12.60
Type of Drive										
Front-Wheel	567	36	52	49	60	102	125	88	55	10.85
Rear-Wheel	833	71	96	72	78	171	166	117	63	9.05
4-Wheel	111	Q	Q	10	16	25	22	21	7	19.74

See footnote at end of table

Table 12. U.S. Vehicle Miles Traveled by Family Income, 1988 (Continued)
(Billion Miles)

Household and Vehicle Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor:	0.389	1.508	1.167	1.296	1.209	0.844	0.814	0.936	1.526	
Type of Fuel System										
Carburetor	1,073	90	121	99	117	219	209	146	72	8.07
Fuel Injection	415	20	29	32	34	75	99	76	50	11.93
Diesel Engine	24	Q	Q	Q	Q	Q	Q	Q	Q	47.83
Type of Fuel Purchased										
Motor Gasoline	1,484	110	151	130	151	293	307	222	122	7.02
Unleaded	1,338	92	125	119	138	266	281	206	112	7.39
Regular Grade	851	64	80	74	89	171	173	136	64	9.56
Intermediate Grade	87	Q	Q	Q	10	17	21	11	Q	27.68
Premium Grade	401	22	38	39	38	78	86	59	41	13.37
Leaded	146	18	26	12	13	27	26	16	10	22.09
Diesel Fuel	24	Q	Q	Q	Q	Q	Q	Q	Q	47.83
Type of Primary Service										
Full-Service Pumps	210	17	23	14	17	45	43	27	25	19.17
Self or Mini-Service Pumps	1,242	89	123	112	134	242	258	193	91	8.02
Both Equally	56	Q	Q	Q	Q	10	12	6	Q	37.82
Vehicle Used on the Job										
Yes	211	Q	12	15	18	41	56	41	21	17.95
No	1,300	104	141	117	136	256	257	185	104	7.36

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 13. U.S. Vehicle Fuel Consumption by Family Income, 1988
(Billion Gallons)

Household and Vehicle Characteristics	All Income Categories	1987 Family Income								RBE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RBE Column Factor	9.372	1.486	1.196	1.316	1.194	0.847	0.815	0.914	1.526	
Household Characteristics										
Total	82.4	6.6	9.0	7.3	8.5	16.4	16.5	11.8	6.3	7.15
Census Region and Division										
Northeast	14.0	.8	1.1	.8	1.4	2.7	3.3	2.1	1.8	14.85
New England	3.4	Q	Q	Q	.4	.7	.8	.5	.4	30.70
Middle Atlantic	10.6	.6	.9	.7	1.0	1.9	2.5	1.6	1.4	16.09
Midwest	20.8	1.4	2.5	2.3	2.3	4.0	4.6	2.7	1.0	13.84
East North Central	14.3	1.0	1.9	1.4	1.5	2.7	3.2	2.1	.5	17.34
West North Central	6.5	Q	.6	.9	.9	1.3	1.4	.6	Q	20.53
South	29.6	3.0	3.9	2.9	3.2	6.1	5.2	3.6	1.7	19.10
South Atlantic	14.6	1.1	1.8	1.5	1.8	2.5	2.8	1.8	1.3	18.28
East South Central	5.6	Q	.8	Q	.5	1.5	.9	.4	Q	25.42
West South Central	9.4	1.2	1.3	.9	.9	2.0	1.6	1.4	Q	22.63
West	18.1	1.4	1.5	1.3	1.5	3.7	3.4	3.4	1.9	12.94
Mountain	4.7	.6	Q	.5	Q	1.0	.8	.7	Q	22.70
Pacific	13.3	.9	1.1	.7	1.0	2.7	2.6	2.7	1.6	15.25
Metropolitan Status										
Metropolitan	62.6	4.2	5.7	4.9	5.8	12.7	13.0	10.4	5.9	8.10
Central City	20.5	1.9	2.7	1.6	2.3	4.9	3.2	2.9	1.0	14.47
Outside Central City	42.2	2.3	3.0	3.3	3.5	7.8	9.8	7.5	4.8	10.57
Nonmetropolitan	19.8	2.4	3.3	2.4	2.7	3.7	3.5	1.4	.4	15.13
Household Size										
1 Person	9.9	2.2	2.0	1.2	1.0	2.2	.7	Q	Q	16.72
2 Persons	26.6	2.2	3.5	2.5	2.6	5.0	5.0	4.0	1.8	12.41
3 Persons	17.2	.9	1.4	1.3	1.8	3.8	3.9	3.1	1.0	17.30
4 Persons	15.9	.7	1.1	1.2	1.7	2.7	3.6	3.2	1.7	18.21
5 or More Persons	12.8	Q	1.0	1.1	1.3	2.7	3.3	1.1	1.6	21.37
Household Composition										
Households with Children	36.4	2.0	3.3	3.2	4.0	7.4	8.4	4.7	3.4	12.44
Age of Oldest Child										
Under 7 Years	10.2	.7	Q	1.0	1.1	2.3	2.5	1.4	Q	19.40
7 to 15 Years	17.5	1.2	1.8	1.6	2.1	3.8	3.7	2.1	1.2	16.96
16 or 17 Years	8.7	Q	.6	.6	.8	1.3	2.3	1.2	1.7	25.02
Households without Children	46.0	4.6	5.7	4.2	4.5	9.0	8.1	7.1	2.9	9.59
One Adult	9.9	2.2	2.0	1.2	1.0	2.2	.7	Q	Q	16.72
Age of Householder										
Under 35 Years	3.4	Q	Q	.6	Q	.8	Q	Q	Q	29.53
35 to 59 Years	3.7	Q	.6	Q	Q	1.2	Q	Q	Q	30.52
60 Years or More	2.9	1.2	.7	.3	Q	Q	Q	Q	Q	22.75
Two or More Adults	36.1	2.5	3.7	2.9	3.4	6.8	7.4	6.7	2.7	11.30
Age of Householder										
Under 35 Years	8.3	.6	Q	.9	.8	2.0	2.0	1.1	Q	23.29
35 to 59 Years	16.7	1.0	.9	1.0	1.1	2.5	3.9	4.3	2.0	17.46
60 Years or More	11.1	.9	2.2	1.1	1.5	2.3	1.4	1.3	.5	18.43
Origin of Householder										
White	73.5	5.1	7.9	6.6	7.5	14.9	14.8	10.8	5.9	7.76
Black	6.2	1.3	.8	Q	.7	1.2	1.0	.5	Q	30.22
Other	2.8	Q	Q	Q	.3	Q	.8	Q	Q	45.69
Hispanic Descent										
Yes	4.5	Q	Q	Q	Q	Q	1.3	.5	Q	38.96
No	78.0	6.4	8.5	6.9	8.1	15.7	15.3	11.3	5.9	7.28
Number of Drivers (fall 1987)										
1	14.4	3.1	3.0	1.9	1.6	2.9	1.2	Q	Q	13.64
2	46.7	2.9	4.8	4.0	4.9	10.1	10.1	6.7	3.1	10.11
3	13.0	Q	.8	1.0	1.3	2.6	2.9	2.9	1.2	20.25
4 or More	8.0	Q	Q	Q	.6	.7	2.3	1.7	1.7	26.33

See footnote at end of table

Table 13. U.S. Vehicle Fuel Consumption by Family Income, 1988 (Continued)
(Billion Gallons)

Household and Vehicle Characteristics	All Income Categories	1987 Family Income								RBE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
Average Number of Vehicles per Household per year										
Part-Year Vehicle	1.2	Q	Q	Q	Q	Q	Q	Q	NC	71.76
Only 1	12.9	2.9	2.7	1.8	1.6	2.2	1.0	Q	Q	14.17
Between 1 and 2	8.5	1.0	1.3	1.1	.9	1.9	1.1	0.7	Q	22.47
Only 2	26.7	1.5	2.4	1.9	2.9	6.1	6.3	3.7	1.9	12.25
Between 2 and 3	11.4	Q	.8	1.0	1.0	3.1	2.2	2.1	.7	19.75
Only 3	9.5	Q	.7	1.0	1.0	1.1	2.1	2.1	1.3	24.40
Between 3 and 4	5.8	Q	Q	Q	Q	.6	2.1	1.5	.5	28.47
4 or More	6.4	Q	Q	Q	.5	1.2	1.6	1.2	1.2	32.64
Vehicle Characteristics										
Model Year										
1988 or 1989	4.2	Q	Q	.4	.3	.8	.8	.9	.5	22.09
1987	7.0	Q	.5	.4	.6	1.3	1.6	1.4	.8	19.47
1986	8.9	Q	.5	.5	1.0	1.6	2.3	1.7	.9	18.50
1985	7.5	Q	.6	.7	.8	1.3	1.7	1.4	.7	18.44
1984	7.3	Q	.5	.8	.8	1.2	1.7	1.5	.5	17.63
1983	4.1	.4	Q	Q	.5	.9	1.0	.6	Q	22.98
1982	4.1	Q	.4	.5	.4	.9	.7	.7	Q	21.79
1981	4.2	Q	Q	.4	.4	.9	.9	.5	Q	25.02
1979 or 1980	9.7	.8	1.1	1.1	1.2	2.4	1.7	.9	.5	17.72
1977 or 1978	9.4	1.1	1.5	.7	1.0	1.8	2.0	.8	.6	18.58
1975 or 1976	5.9	.8	.9	.8	.6	1.2	.8	.6	Q	23.43
1974 or Earlier	10.2	1.5	2.1	.8	1.0	2.0	1.4	.8	Q	23.92
Type of Vehicle										
Passenger Car	57.5	4.8	6.7	4.9	5.9	11.1	10.9	8.3	4.9	7.91
Mini Van	1.4	Q	Q	Q	Q	Q	.4	Q	Q	38.18
Jeep-Like Vehicle	3.7	Q	Q	Q	Q	.9	.7	.8	Q	29.40
Large Van	3.5	Q	Q	Q	Q	.7	1.0	Q	Q	30.03
Pickup Truck	15.9	1.3	1.8	1.7	1.8	3.4	3.3	1.9	.7	15.39
Other .....	.4	Q	Q	Q	Q	Q	Q	Q	NC	97.57
Fuel Efficiency (miles per gallon)										
10.9 or Less	9.5	1.2	1.7	.9	1.0	1.8	1.8	.7	Q	19.01
11 to 12.9	8.0	.8	.9	.6	1.0	1.9	1.3	1.0	Q	22.43
13 to 15.9	14.9	1.5	1.9	1.7	1.5	2.9	2.6	1.9	.8	15.74
16 to 18.9	13.9	1.0	1.5	1.1	1.4	2.9	2.9	2.2	.9	14.49
19 to 21.9	15.0	.9	1.1	1.3	1.4	2.8	3.2	2.8	1.7	14.94
22 or More	21.1	1.2	1.9	1.8	2.2	4.2	4.7	3.2	1.9	10.96
Engine Size (liters)										
2.49 or Less	22.0	1.4	2.1	1.9	2.2	4.4	4.8	3.2	2.0	11.11
2.50 to 3.49	12.1	.5	1.1	.9	1.2	2.2	2.6	2.4	1.3	14.86
3.50 to 4.49	11.5	1.2	1.2	1.2	1.2	2.3	2.2	1.5	.8	15.12
4.50 or Greater	36.7	3.5	4.7	3.3	4.0	7.5	7.0	4.6	2.2	11.72
Number of Cylinders										
4	25.0	1.6	2.4	2.1	2.5	5.1	5.5	3.7	2.2	10.57
6	20.5	1.6	2.0	1.9	1.9	3.8	4.2	3.4	1.7	11.94
8	36.4	3.4	4.6	3.4	4.0	7.3	6.7	4.6	2.3	11.63
Other .....	.5	Q	Q	Q	Q	Q	Q	Q	Q	75.13
Type of Transmission										
Automatic	62.3	5.2	7.0	5.4	6.4	12.4	12.5	8.6	4.6	7.98
Manual Shift	20.1	1.4	2.0	1.9	2.0	3.9	4.0	3.2	1.7	12.63
Type of Drive										
Front-Wheel	23.7	1.5	2.3	2.1	2.5	4.2	5.2	3.7	2.3	10.78
Rear-Wheel	51.6	4.8	6.4	4.5	4.9	10.6	10.0	6.8	3.6	8.96
4-Wheel	7.1	Q	Q	.7	1.0	1.6	1.4	1.3	.4	20.76

See footnote at end of table

Table 13. U.S. Vehicle Fuel Consumption by Family Income, 1988 (Continued)
(Billion Gallons)

Household and Vehicle Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor:	0.372	1.486	1.195	1.310	1.194	0.847	0.915	0.914	1.526	
Type of Fuel System										
Carburetor	62.3	5.7	7.5	5.8	6.7	12.7	11.9	8.0	3.9	8.23
Fuel Injection	19.0	.9	1.3	1.5	1.6	3.5	4.4	3.6	2.3	11.71
Diesel Engine	1.1	Q	Q	Q	Q	Q	Q	Q	Q	54.48
Type of Fuel Purchased										
Motor Gasoline	81.1	6.6	8.9	7.2	8.3	16.2	16.2	11.5	6.2	7.12
Unleaded	69.9	5.3	6.8	6.4	7.2	14.1	14.3	10.4	5.5	7.40
Regular Grade	45.1	3.8	4.4	4.0	4.8	9.3	8.9	6.8	3.1	9.57
Intermediate Grade	4.4	Q	Q	Q	.5	.8	1.1	.6	Q	27.71
Premium Grade	20.4	1.2	2.0	2.0	1.9	4.0	4.3	3.0	2.1	13.00
Leaded	11.1	1.3	2.1	.9	1.1	2.0	1.9	1.2	.7	21.35
Diesel Fuel	1.1	Q	Q	Q	Q	Q	Q	Q	Q	54.48
Type of Primary Service										
Full-Service Pumps	11.0	1.1	1.2	.7	.9	2.4	2.2	1.4	1.2	18.87
Self or Mini-Service Pumps	68.1	5.3	7.3	6.3	7.4	13.4	13.7	10.0	4.7	8.11
Both Equally	3.1	Q	Q	Q	Q	.5	.6	.3	Q	35.88
Vehicle Used on the Job										
Yes	11.4	Q	.7	.8	1.0	2.3	2.9	2.1	1.1	17.87
No	71.0	6.2	8.3	6.5	7.5	14.1	13.6	9.7	5.2	7.48

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 14. U.S. Average Vehicle Miles Traveled by Family Income, 1988
(Miles per Household)

Household Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor:	0.410	1.544	1.277	1.375	1.052	0.809	0.798	0.999	1.327	
Household Characteristics										
Total	18,595	10,932	12,978	15,837	17,813	18,617	24,170	25,555	27,428	4.16
Census Region and Division										
Northeast	17,997	9,639	12,400	10,501	15,934	16,790	22,966	25,564	28,394	10.54
New England	18,581	Q	Q	Q	19,690	16,127	24,687	28,707	Q	20.53
Middle Atlantic	17,817	10,315	12,722	10,532	14,644	17,070	22,418	24,698	29,392	11.72
Midwest	18,518	10,567	12,433	16,261	19,152	18,558	24,899	26,788	25,491	8.02
East North Central	18,350	11,282	12,048	17,139	17,928	18,168	24,169	27,219	25,578	10.16
West North Central	18,913	9,051	13,840	14,952	21,668	19,459	26,827	25,402	Q	13.02
South	18,859	11,124	13,413	18,435	18,559	19,849	25,684	26,579	27,143	7.51
South Atlantic	19,525	11,782	13,212	18,260	20,102	18,895	26,136	25,211	28,337	10.32
East South Central	18,180	10,720	15,097	Q	16,807	21,888	22,544	Q	Q	15.06
West South Central	18,193	10,653	12,697	20,058	16,982	19,723	27,295	29,777	Q	13.06
West	18,783	11,877	13,347	15,464	16,579	18,347	22,431	23,619	27,857	8.57
Mountain	19,581	13,292	15,216	Q	Q	21,299	25,974	23,830	Q	16.82
Pacific	18,520	11,035	12,642	15,455	15,232	17,428	21,652	23,568	26,846	9.83
Metropolitan Status										
Metropolitan	18,586	10,886	11,948	15,400	16,836	17,957	23,398	25,446	28,036	4.98
Central City	15,669	10,750	11,277	12,418	16,250	17,152	19,612	22,882	17,955	6.71
Outside Central City	20,385	11,003	12,654	17,385	17,212	18,504	24,903	26,633	31,384	5.94
Nonmetropolitan	18,627	11,021	15,422	16,877	20,408	21,527	27,832	26,487	Q	7.59
Household Size										
1 Person	10,813	8,234	9,720	10,539	12,085	13,190	14,840	Q	Q	10.42
2 Persons	16,817	12,007	12,514	15,691	14,232	17,274	20,840	22,146	21,992	6.34
3 Persons	22,679	13,241	19,398	18,102	20,255	22,317	26,070	27,572	29,679	8.72
4 Persons	23,323	14,213	14,262	18,825	23,376	19,106	27,694	31,099	31,634	8.68
5 or More Persons	25,930	Q	16,987	22,378	29,006	24,769	29,417	28,184	36,921	10.37
Household Composition										
Households with Children	22,519	13,822	16,019	18,580	22,969	20,927	27,233	27,423	32,326	5.26
Age of Oldest Child										
Under 7 Years	20,612	14,113	Q	17,933	21,087	20,747	24,728	25,030	Q	8.80
7 to 15 Years	21,301	14,185	15,160	18,757	22,652	20,041	26,357	27,341	28,383	7.37
16 or 17 Years	28,854	Q	21,865	19,230	27,297	24,583	32,710	31,132	42,168	12.00
Households without Children	16,307	10,014	11,741	14,196	14,719	17,077	21,658	24,387	23,290	5.44
One Adult	10,813	8,234	9,720	10,539	12,085	13,190	14,840	Q	Q	10.42
Age of Householder										
Under 35 Years	13,841	Q	13,794	12,036	Q	15,393	Q	Q	Q	15.56
35 to 59 Years	12,476	9,177	11,696	Q	13,603	13,058	12,600	Q	Q	15.52
60 Years or More	7,229	6,717	6,902	6,811	Q	8,945	Q	Q	Q	16.28
Two or More Adults	19,015	12,449	13,254	16,885	15,830	18,978	22,835	25,456	25,211	5.99
Age of Householder										
Under 35 Years	20,300	Q	Q	20,776	18,695	21,526	22,240	22,536	Q	11.63
35 to 59 Years	23,420	16,559	16,399	20,510	18,440	19,642	25,428	29,444	28,392	9.66
60 Years or More	14,058	8,003	11,999	12,792	13,020	16,491	18,128	19,180	18,108	8.59
Origin of Householder										
White	18,824	10,992	12,878	16,016	17,648	18,491	24,508	25,756	27,231	4.46
Black	16,006	10,883	13,199	Q	19,497	19,761	19,100	Q	Q	17.17
Other	19,441	Q	Q	Q	18,204	Q	26,442	Q	Q	21.04
Hispanic Descent										
Yes	18,674	Q	Q	Q	Q	17,344	24,874	Q	Q	18.44
No	18,591	10,908	13,018	16,127	17,700	18,676	24,118	25,624	26,904	4.16
Number of Drivers (fall 1987)										
1	10,842	8,554	9,469	11,623	10,780	13,474	14,753	Q	Q	9.39
2	19,503	14,826	15,187	16,665	18,975	19,063	22,762	23,009	23,444	5.05
3	28,536	Q	23,926	25,583	27,763	26,155	30,149	33,340	30,976	9.10
4 or More	36,583	Q	Q	Q	Q	Q	38,221	35,044	44,480	9.14

See footnote at end of table

Table 14. U.S. Average Vehicle Miles Traveled by Family Income, 1988 (Continued)
(Miles per Household)

Household Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor:	0.410	1.644	1.277	1.375	1.052	0.805	0.758	0.999	1.027	
Average Number of Vehicles per Household per year										
Part-Year Vehicle	5,271	Q	Q	Q	Q	Q	Q	Q	NC	47.75
Only 1	10,170	8,597	9,437	10,364	10,995	11,231	13,501	11,415	Q	8.43
Between 1 and 2	17,049	13,603	17,099	16,796	15,660	17,715	19,285	17,914	Q	10.21
Only 2	20,251	15,130	16,203	16,961	19,930	20,378	22,873	22,093	23,465	6.53
Between 2 and 3	25,456	Q	23,546	27,583	25,646	22,954	27,007	28,224	27,270	8.77
Only 3	28,995	Q	23,119	26,821	30,268	24,476	28,349	32,421	34,351	11.84
Between 3 and 4	36,820	Q	Q	Q	Q	Q	37,079	37,515	Q	12.11
4 or More	42,332	Q	Q	Q	Q	39,347	42,846	43,918	52,574	13.19

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 15. U.S. Average Vehicle Fuel Consumption by Family Income, 1988
(Gallons per Household)

Household Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor	0.819	1.337	1.341	1.373	1.359	0.809	0.780	0.997	1.301	
Household Characteristics										
Total	1,014	652	762	879	980	1,025	1,275	1,330	1,391	4.42
Census Region and Division										
Northeast	917	531	654	558	828	859	1,167	1,253	1,388	10.36
New England	942	Q	Q	Q	956	803	1,196	1,486	Q	20.77
Middle Atlantic	909	555	649	554	785	883	1,158	1,188	1,438	11.62
Midwest	1,016	615	734	913	1,073	1,015	1,343	1,376	1,286	8.37
East North Central	996	661	699	938	1,003	978	1,290	1,390	1,291	10.21
West North Central	1,062	519	858	875	1,216	1,101	1,481	1,330	Q	15.22
South	1,046	683	816	1,038	1,022	1,091	1,347	1,399	1,411	7.78
South Atlantic	1,028	642	814	935	1,081	1,000	1,285	1,277	1,442	9.46
East South Central	1,036	777	850	Q	1,070	1,177	1,123	Q	Q	15.17
West South Central	1,081	679	797	1,279	907	1,159	1,676	1,617	Q	14.53
West	1,046	715	775	838	934	1,083	1,206	1,278	1,437	9.67
Mountain	1,105	774	860	Q	Q	1,240	1,486	1,279	Q	16.96
Pacific	1,027	680	743	845	845	1,034	1,145	1,278	1,377	11.57
Metropolitan Status										
Metropolitan	995	631	688	833	917	977	1,219	1,313	1,413	5.15
Central City	852	618	629	661	917	936	1,050	1,165	983	6.92
Outside Central City	1,083	642	751	948	916	1,005	1,286	1,382	1,556	6.31
Nonmetropolitan	1,081	694	938	989	1,146	1,237	1,545	1,476	Q	8.44
Household Size										
1 Person	586	484	559	561	647	702	685	Q	Q	10.46
2 Persons	928	706	740	877	809	956	1,103	1,170	1,155	6.91
3 Persons	1,209	779	1,099	1,022	1,115	1,225	1,334	1,423	1,396	8.66
4 Persons	1,257	895	843	1,066	1,281	1,036	1,476	1,583	1,640	9.00
5 or More Persons	1,449	Q	1,067	1,233	1,532	1,421	1,638	1,548	1,897	10.75
Household Composition										
Households with Children	1,216	820	963	1,011	1,239	1,155	1,445	1,383	1,647	5.82
Age of Oldest Child										
Under 7 Years	1,077	772	Q	985	1,069	1,112	1,251	1,173	Q	9.73
7 to 15 Years	1,188	881	923	1,012	1,284	1,124	1,454	1,430	1,474	8.09
16 or 17 Years	1,521	Q	1,266	1,056	1,420	1,365	1,718	1,605	2,081	12.82
Households without Children	896	599	681	800	824	939	1,137	1,298	1,176	5.89
One Adult	586	484	559	561	647	702	685	Q	Q	10.46
Age of Householder										
Under 35 Years	680	Q	782	617	Q	728	Q	Q	Q	17.93
35 to 59 Years	689	581	721	Q	794	747	586	Q	Q	15.76
60 Years or More	434	428	380	439	Q	509	Q	Q	Q	16.32
Two or More Adults	1,049	756	772	976	898	1,055	1,215	1,360	1,288	6.99
Age of Householder										
Under 35 Years	1,028	Q	Q	1,095	993	1,069	1,150	1,048	Q	13.40
35 to 59 Years	1,298	1,045	949	1,243	1,018	1,176	1,341	1,616	1,444	9.89
60 Years or More	824	517	727	768	786	942	1,031	1,065	987	9.82
Origin of Householder										
White	1,028	649	772	895	981	1,028	1,282	1,341	1,380	4.73
Black	864	689	685	Q	992	1,001	1,017	Q	Q	16.79
Other	1,047	Q	Q	Q	922	Q	1,673	Q	Q	26.42
Hispanic Descent										
Yes	1,049	Q	Q	Q	Q	938	1,410	Q	Q	21.66
No	1,012	650	764	895	971	1,030	1,265	1,324	1,376	4.40
Number of Drivers (fall 1987)										
1	594	497	542	624	583	714	776	728	Q	9.32
2	1,068	896	911	931	1,049	1,053	1,199	1,187	1,239	5.56
3	1,561	Q	1,313	1,502	1,588	1,509	1,584	1,780	1,537	10.05
4 or More	1,920	Q	Q	Q	Q	Q	2,040	1,843	2,184	9.33

See footnote at end of table

Table 15. U.S. Average Vehicle Fuel Consumption by Family Income, 1988 (Continued)
(Gallons per Household)

Household Characteristics	All Income Categories	1987 Family Income								RSE Row Factor
		Less than \$10,000	\$10,000 to \$14,999	\$15,000 to \$19,999	\$20,000 to \$24,999	\$25,000 to \$34,999	\$35,000 to \$49,999	\$50,000 to \$74,999	\$75,000 or More	
RSE Column Factor	0.410	1.501	1.241	1.375	1.069	0.806	0.780	0.987	1.301	
Average Number of Vehicles per Household per year										
Part-Year Vehicle	316	Q	Q	Q	Q	Q	Q	Q	NC	48.24
Only 1	526	488	508	543	544	553	607	538	Q	8.74
Between 1 and 2	936	813	1,041	892	881	977	970	904	Q	10.33
Only 2	1,100	959	970	952	1,100	1,132	1,185	1,093	1,261	5.61
Between 2 and 3	1,386	Q	1,405	1,574	1,375	1,280	1,412	1,467	1,350	8.91
Only 3	1,614	Q	1,470	1,664	1,776	1,404	1,567	1,728	1,681	10.86
Between 3 and 4	2,078	Q	Q	Q	Q	Q	2,119	2,069	Q	12.01
4 or More	2,407	Q	Q	Q	Q	2,455	2,364	2,550	2,561	11.73

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 16. U.S. Vehicles by Household Composition, 1988
(Million Vehicles)

Household and Vehicle Characteristics	Households with Children				Households without Children							RSE New Factor
	Total	Age of Oldest Child			Total	One Adult, Age of Householder			Two or More Adults, Age of Householder			
		Under 7 Years	7 to 15 Years	16 or 17 Years		Under 35 Years	35 to 59 Years	60 Years or Over	Under 35 Years	35 to 59 Years	60 Years or Over	
RSE Column Factor	0.373	1.006	0.826	1.269	0.456	1.579	1.596	1.351	1.185	0.846	0.957	
Household Characteristics												
Total	59.8	17.3	28.7	13.8	87.7	5.7	7.1	7.0	14.3	29.4	24.2	5.59
Census Region and Division												
Northeast	10.5	3.0	4.7	2.7	16.1	1.2	.8	1.6	2.0	5.9	4.7	12.46
New England	2.8	.8	1.5	.4	3.8	Q	Q	.5	.6	1.7	.8	22.63
Middle Atlantic	7.7	2.2	3.2	2.3	12.3	1.0	.7	1.2	1.3	4.2	3.9	14.65
Midwest	15.3	4.2	7.6	3.4	22.5	1.2	1.6	1.9	4.1	6.9	6.8	11.08
East North Central	10.2	3.1	5.1	1.9	15.8	.6	.9	1.4	3.0	5.1	4.8	13.47
West North Central	5.1	1.1	2.5	1.5	6.7	.6	.7	Q	1.1	1.8	2.0	18.45
South	20.8	6.5	10.2	4.0	29.8	2.2	3.0	2.3	4.5	10.5	7.3	10.40
South Atlantic	11.2	3.5	5.2	2.4	14.7	1.4	1.4	.9	1.8	5.5	3.8	14.73
East South Central	3.7	.9	2.0	Q	5.8	Q	.6	.7	1.2	1.8	1.2	20.63
West South Central	6.0	2.1	3.0	.8	9.3	Q	1.0	.7	1.5	3.3	2.2	22.86
West	13.2	3.5	6.0	3.7	19.3	1.2	1.8	1.1	3.8	6.0	5.4	11.76
Mountain	3.3	.6	1.8	.9	5.2	Q	.5	Q	1.0	1.6	1.2	25.99
Pacific	9.9	2.9	4.2	2.8	14.1	.8	1.3	.7	2.8	4.4	4.2	13.29
Metropolitan Status												
Metropolitan	45.6	13.7	21.3	10.5	68.3	4.7	5.7	5.3	12.0	23.2	17.4	6.61
Central City	13.6	4.9	6.4	2.4	25.1	1.9	2.8	2.6	5.6	6.5	5.7	10.84
Outside Central City	32.0	8.9	15.0	8.1	43.2	2.7	3.0	2.7	6.4	16.7	11.7	8.29
Nonmetropolitan	14.2	3.6	7.3	3.3	19.4	1.0	1.4	1.7	2.4	6.1	6.8	10.90
Household Size												
1 Person	NC	NC	NC	NC	19.8	5.7	7.1	7.0	NC	NC	NC	5.91
2 Persons	1.8	.5	.8	Q	49.5	NC	NC	NC	12.2	17.8	19.5	12.13
3 Persons	17.9	8.5	6.1	3.3	10.9	NC	NC	NC	1.2	6.3	3.4	13.24
4 Persons	21.6	6.2	11.9	3.5	5.2	NC	NC	NC	.5	3.9	.7	17.39
5 or More Persons	18.6	2.1	9.8	6.6	2.2	NC	NC	NC	Q	1.3	.5	21.85
Origin of Householder												
White	51.4	15.2	24.1	12.1	80.8	5.1	6.2	6.4	13.2	27.2	22.7	6.22
Black	5.5	1.3	3.3	.9	5.1	.6	.7	.6	.6	1.6	1.2	21.12
Other	3.0	.8	1.3	.9	1.7	NC	Q	Q	.6	.6	Q	34.40
Hispanic Descent												
Yes	4.3	1.0	2.2	1.1	3.3	Q	Q	Q	.9	.8	.9	29.67
No	55.6	16.4	26.5	12.7	84.4	5.4	6.8	6.9	13.4	28.5	23.3	5.74
1987 Family Income												
Less than \$10,000	3.4	1.2	2.0	Q	9.9	.9	.9	3.0	1.1	1.7	2.3	16.39
\$10,000 to \$14,999	5.3	1.4	3.0	.9	11.6	1.1	1.2	1.9	1.0	1.7	4.7	17.55
\$15,000 to \$19,999	5.4	1.7	2.7	1.0	8.0	1.0	.6	.7	1.5	1.6	2.5	17.75
\$20,000 to \$24,999	6.4	1.8	3.1	1.5	8.7	.6	.9	Q	1.5	2.1	3.1	17.57
\$25,000 to \$34,999	12.3	3.9	6.5	2.0	16.9	1.2	2.3	Q	3.5	4.5	4.8	12.46
\$35,000 to \$49,999	13.5	4.0	5.9	3.7	14.8	Q	Q	Q	3.4	7.1	2.9	12.91
\$50,000 to \$74,999	7.9	2.5	3.5	1.9	12.6	Q	Q	Q	2.1	7.2	2.8	16.03
\$75,000 or More	5.6	.8	2.1	2.7	5.2	Q	Q	Q	.4	3.3	1.0	24.89
Below 100% of Poverty	4.8	1.3	3.0	.5	4.6	Q	Q	.7	.8	.9	1.3	21.72
Below 125% of Poverty	8.6	2.4	4.7	1.5	7.7	.6	.6	1.9	.8	1.8	2.0	16.83
Number of Drivers (fall 1987)												
1	4.4	1.5	2.5	Q	24.3	5.7	7.0	6.7	Q	1.1	3.4	10.79
2	36.3	14.3	19.8	2.2	47.0	NC	NC	NC	12.0	17.6	17.5	7.13
3	12.0	.9	4.7	6.5	9.4	NC	NC	NC	1.2	6.1	2.1	17.78
4 or More	6.8	.5	1.6	4.7	6.4	NC	NC	NC	Q	4.7	.9	24.39

See footnote at end of table

Table 16. U.S. Vehicles by Household Composition, 1988 (Continued)
(Million Vehicles)

Household and Vehicle Characteristics	Households with Children				Households without Children							RSE Row Factor
	Total	Age of Oldest Child			Total	One Adult, Age of Householder			Two or More Adults, Age of Householder			
		Under 7 Years	7 to 15 Years	16 or 17 Years		Under 35 Years	35 to 59 Years	60 Years or Over	Under 35 Years	35 to 59 Years	60 Years or Over	
RSE Column Factor	0.571	1.006	0.828	1.289	0.455	1.679	1.896	1.351	1.185	0.848	0.957	
Average Number of Vehicles per Household per year												
Part-Year Vehicle	0.9	0.4	0.4	Q	1.2	Q	Q	Q	0.3	Q	0.3	30.95
Only 1	5.2	1.7	2.8	0.7	19.3	3.5	3.2	5.3	1.5	1.6	4.1	10.10
Between 1 and 2	6.0	2.0	2.7	1.3	7.7	1.1	.9	.7	1.9	1.8	1.3	16.50
Only 2	19.9	7.3	10.5	2.1	28.8	.7	1.5	.8	5.8	9.0	11.0	11.10
Between 2 and 3	10.3	2.9	5.3	2.1	9.6	Q	Q	NC	2.6	4.4	2.3	14.85
Only 3	7.2	1.4	3.9	1.9	10.4	NC	.8	NC	.9	5.3	3.4	19.94
Between 3 and 4	4.8	.9	1.6	2.3	4.7	NC	NC	NC	.8	3.1	.8	25.82
4 or More	5.5	.6	1.5	3.4	5.9	Q	Q	NC	Q	4.1	.9	26.72
Vehicle Characteristics												
Model Year												
1988 or 1989	3.0	.9	1.2	.8	4.2	.5	Q	Q	.8	1.2	1.2	16.27
1987	4.9	1.5	2.4	.9	7.1	.7	Q	Q	1.5	2.7	1.4	15.11
1986	6.3	2.1	2.7	1.5	9.2	Q	.6	Q	2.0	3.1	2.4	12.97
1985	5.1	1.3	2.6	1.2	8.0	.6	Q	Q	1.7	2.7	2.1	13.07
1984	5.5	1.5	2.6	1.4	7.8	Q	.9	.7	1.1	2.4	2.2	12.87
1983	3.1	1.0	1.4	.7	5.0	Q	Q	Q	.6	1.7	1.3	17.84
1982	3.4	1.0	1.6	.9	4.7	Q	Q	Q	.8	1.7	1.1	17.53
1981	3.4	1.0	1.3	1.1	5.0	Q	Q	Q	1.0	1.5	1.1	17.51
1979 or 1980	7.0	1.8	3.4	1.8	10.0	.6	.7	.8	1.3	3.7	2.9	12.60
1977 or 1978	7.0	1.8	3.6	1.6	8.7	Q	.6	.7	1.2	2.9	2.7	13.46
1975 or 1976	4.0	1.2	2.1	.7	5.9	Q	Q	Q	.8	1.9	1.9	14.91
1974 or Earlier	7.0	2.1	3.7	1.2	12.3	.6	1.3	1.2	1.5	3.9	3.7	13.68
Type of Vehicle												
Passenger Car	43.0	12.7	20.1	10.2	66.3	4.6	5.5	6.2	10.8	20.9	18.3	5.76
Mini Van	1.5	.4	.9	Q	.7	Q	NC	NC	Q	.4	Q	28.21
Jeep-Like Vehicle	2.2	.6	1.1	.5	2.5	Q	Q	Q	.6	1.1	Q	22.60
Large Van	2.4	.5	1.3	.6	2.2	Q	Q	Q	Q	.9	.7	21.30
Pickup Truck	10.5	3.1	5.2	2.3	15.4	.7	1.2	Q	2.6	6.0	4.3	10.62
Other	Q	Q	Q	Q	.5	NC	NC	Q	Q	Q	Q	54.09
Fuel Efficiency (miles per gallon)												
12.9 or Less	10.6	2.7	5.8	2.2	17.6	.5	1.7	1.8	1.9	5.9	5.6	11.59
13 to 15.9	10.1	2.6	5.1	2.4	14.3	1.0	1.1	1.4	1.6	5.0	4.2	11.66
16 to 18.9	8.6	2.5	4.3	1.8	15.6	Q	1.1	1.3	2.5	5.2	5.0	11.12
19 to 21.9	11.0	3.0	5.4	2.6	15.0	1.2	1.2	1.0	2.3	5.1	4.3	11.18
22 to 24.9	7.4	2.3	3.0	2.1	9.5	.6	.8	.7	1.9	3.2	2.2	12.74
25 or More	11.9	4.2	4.9	2.8	15.4	2.0	1.2	.7	4.0	4.9	2.6	10.69
Engine Size (liters)												
2.49 or Less	20.8	7.0	8.6	5.2	28.5	2.7	2.4	2.0	6.8	8.9	5.8	8.30
2.50 to 3.49	9.1	2.5	4.8	1.8	12.6	1.0	.8	.8	2.3	4.2	3.5	11.93
3.50 to 4.49	8.0	2.3	3.4	2.3	13.3	.7	1.0	1.4	1.3	4.6	4.3	11.96
4.50 or Greater	21.9	5.5	11.9	4.5	33.3	1.3	2.9	2.9	4.0	11.6	10.6	9.13
Number of Cylinders												
4	23.5	7.5	10.1	5.9	31.8	2.9	2.5	2.1	7.2	9.9	7.1	7.84
6	14.6	4.3	7.0	3.3	21.5	1.3	1.8	1.8	2.9	7.7	6.0	9.59
8	21.4	5.4	11.4	4.5	33.8	1.4	2.8	3.1	4.0	11.5	10.9	8.90
Type of Transmission												
Automatic	41.9	11.4	20.9	9.7	63.7	3.2	5.0	6.1	8.4	21.2	19.8	6.12
Manual Shift	17.9	5.9	7.8	4.2	24.0	2.6	2.1	.8	5.9	8.2	4.3	9.28

See footnote at end of table

Table 16. U.S. Vehicles by Household Composition, 1988 (Continued)
(Million Vehicles)

Household and Vehicle Characteristics	Households with Children				Households without Children							RSE Row Factor
	Total	Age of Oldest Child			Total	One Adult, Age of Householder			Two or More Adults, Age of Householder			
		Under 7 Years	7 to 15 Years	16 or 17 Years		Under 35 Years	35 to 59 Years	60 Years or Over	Under 35 Years	35 to 59 Years	60 Years or Over	
RSE Column Factor	0.571	1.036	0.525	1.259	0.455	1.579	1.595	1.351	1.155	0.846	0.957	
Type of Drive												
Front-Wheel	19.6	6.6	8.4	4.6	28.3	2.3	2.4	2.7	5.4	8.6	6.9	8.21
Rear-Wheel	35.7	9.7	17.9	8.1	53.4	3.0	4.3	4.0	7.8	18.2	16.2	7.06
4-Wheel	4.5	1.1	2.3	1.1	5.9	Q	Q	Q	1.2	2.6	1.0	16.04
Type of Fuel System												
Carburetor	45.7	13.4	21.8	10.4	65.8	4.0	5.4	5.6	10.5	22.0	18.4	6.19
Fuel Injection	13.2	3.7	6.2	3.2	20.7	1.6	1.7	1.4	3.7	6.9	5.3	9.84
Diesel Engine .....	.9	Q	.6	Q	1.2	Q	Q	Q	Q	.4	Q	36.33
Type of Fuel Purchased												
Motor Gasoline	58.9	17.2	28.1	13.6	86.2	5.6	7.1	6.9	14.2	28.7	23.7	5.80
Unleaded	50.9	14.9	23.9	12.1	74.3	4.9	6.0	6.2	12.5	24.7	20.1	6.83
Regular Grade	32.8	10.0	14.8	8.0	47.9	2.8	3.6	4.0	7.8	15.9	13.7	7.23
Intermediate Grade	3.1	.8	1.7	.6	4.6	Q	Q	Q	.9	1.3	1.1	21.51
Premium Grade	15.0	4.1	7.4	3.4	21.9	1.5	2.0	1.8	3.8	7.5	5.2	10.57
Leaded	8.0	2.2	4.2	1.6	11.8	.7	1.1	.7	1.7	4.0	3.6	12.91
Diesel Fuel .....	.9	Q	.6	Q	1.2	Q	Q	Q	Q	.4	Q	38.33
Type of Primary Service												
Full-Service Pumps	7.8	1.9	4.1	1.7	14.5	Q	.9	2.8	1.5	4.1	4.9	13.97
Self or Mini-Service Pumps	50.1	14.6	24.0	11.6	69.4	5.1	6.0	4.1	12.3	23.8	18.1	6.45
Both Equally	1.9	.8	.5	.6	3.6	Q	Q	Q	.6	1.3	1.1	29.23
Vehicle Used on the Job												
Yes	7.2	2.1	3.2	1.9	9.8	.7	1.0	Q	2.1	3.9	1.8	12.41
No	52.6	15.2	25.4	12.0	77.9	5.0	6.1	6.7	12.3	25.4	22.4	5.87

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse.

• Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 17. U.S. Average Vehicle Miles Traveled by Household Composition, 1988
(Miles per Household)

Household Characteristics	Households with Children				Households without Children							RSE Row Factor
	Total	Age of Oldest Child			Total	One Adult, Age of Householder			Two or More Adults, Age of Householder			
		Under 7 Years	7 to 15 Years	16 or 17 Years		Under 35 Years	35 to 59 Years	60 Years or Over	Under 35 Years	35 to 59 Years	60 Years or Over	
RSE Column Factor	0.576	0.869	0.791	1.175	0.599	1.590	1.355	1.660	1.054	0.929	0.991	
Household Characteristics												
Total	22,519	20,612	21,301	28,854	16,307	13,841	12,476	7,229	20,300	23,420	14,058	4.11
Census Region and Division												
Northeast	21,740	19,134	20,834	27,767	15,955	14,504	10,853	7,815	19,395	23,891	13,261	8.95
New England	22,486	21,444	21,698	Q	16,173	Q	Q	Q	Q	23,719	12,271	15.36
Middle Atlantic	21,484	18,412	20,468	27,850	15,892	14,796	10,246	7,981	20,195	23,958	13,439	10.42
Midwest	22,710	19,878	21,506	31,795	16,183	12,803	11,627	6,950	21,313	23,847	14,389	7.52
East North Central	21,965	19,791	21,103	29,461	16,374	Q	Q	7,143	21,157	23,350	14,577	7.84
West North Central	24,394	20,142	22,323	36,153	15,724	Q	10,961	Q	21,755	25,251	13,874	13.27
South	22,837	21,990	21,435	28,719	16,403	14,675	13,119	7,186	20,254	22,795	13,920	7.64
South Atlantic	22,707	21,507	21,961	26,665	17,321	15,333	14,064	6,949	24,600	23,335	14,101	10.36
East South Central	24,717	22,380	24,342	Q	14,828	Q	Q	Q	Q	21,599	13,041	16.07
West South Central	21,992	22,643	18,843	Q	16,026	Q	13,071	9,097	16,349	22,621	14,082	12.56
West	22,420	20,278	21,197	27,464	16,624	12,731	13,233	6,930	19,775	23,639	14,582	8.15
Mountain	23,979	Q	20,439	Q	17,360	Q	Q	Q	Q	23,686	14,302	17.45
Pacific	21,972	20,068	21,485	25,313	16,362	Q	13,352	7,071	18,310	23,621	14,666	10.46
Metropolitan Status												
Metropolitan	22,487	20,691	21,403	28,390	16,373	13,610	12,352	7,016	19,953	23,598	14,148	4.72
Central City	18,551	18,652	17,875	20,338	14,282	12,642	10,617	7,224	17,786	21,446	12,889	7.93
Outside Central City	24,537	22,010	23,159	31,508	17,788	14,363	14,075	6,816	22,131	24,476	14,835	5.77
Nonmetropolitan	22,621	20,302	21,010	30,297	16,071	15,103	12,960	7,876	22,214	22,763	13,815	6.72
Household Size												
1 Person	NC	NC	NC	NC	10,813	13,841	12,476	7,229	NC	NC	NC	4.85
2 Persons	14,344	Q	12,282	Q	16,952	NC	NC	NC	19,954	19,846	12,882	6.52
3 Persons	22,086	21,066	20,271	29,479	23,840	NC	NC	NC	18,049	28,240	19,737	8.34
4 Persons	21,919	20,653	21,254	27,310	31,964	NC	NC	NC	Q	34,297	Q	7.17
5 or More Persons	25,303	21,290	23,638	30,207	33,374	NC	NC	NC	Q	36,968	Q	10.72
Origin of Householder												
White	23,049	20,569	21,598	31,337	16,565	14,197	12,820	7,284	20,415	23,963	14,108	4.38
Black	19,414	19,436	20,699	Q	12,923	Q	Q	Q	Q	17,671	13,460	19.45
Other	20,910	Q	17,935	Q	17,011	NC	Q	Q	Q	Q	Q	21.16
Hispanic Descent												
Yes	21,516	21,041	18,614	Q	15,590	Q	Q	Q	Q	Q	Q	20.07
No	22,599	20,585	21,540	28,780	16,337	13,694	12,558	7,258	20,358	23,775	13,985	4.17
1987 Family Income												
Less than \$10,000	13,822	14,113	14,185	Q	10,014	Q	9,177	6,717	Q	16,559	8,003	13.96
\$10,000 to \$14,999	16,019	Q	15,160	21,865	11,741	13,794	11,696	6,902	Q	16,399	11,999	12.10
\$15,000 to \$19,999	18,580	17,933	18,757	19,230	14,196	12,036	Q	6,811	20,776	20,510	12,792	13.99
\$20,000 to \$24,999	22,969	21,087	22,652	27,297	14,719	Q	13,603	Q	18,695	18,440	13,020	11.18
\$25,000 to \$34,999	20,927	20,747	20,041	24,583	17,077	15,393	13,058	8,945	21,526	19,642	16,491	8.48
\$35,000 to \$49,999	27,233	24,728	26,357	32,710	21,658	Q	12,600	Q	22,240	25,428	18,128	8.07
\$50,000 to \$74,999	27,423	25,030	27,341	31,132	24,387	Q	Q	Q	22,536	29,444	19,180	9.00
\$75,000 or More	32,326	Q	28,383	42,168	23,290	Q	Q	Q	Q	28,392	18,108	10.79
Below 100% of Poverty	14,567	13,381	15,335	Q	10,427	Q	Q	7,876	Q	Q	7,713	18.46
Below 125% of Poverty	16,016	14,782	15,520	20,430	10,469	Q	Q	6,819	Q	17,098	9,037	12.91

See footnote at end of table

Table 17. U.S. Average Vehicle Miles Traveled by Household Composition, 1988 (Continued)
(Miles per Household)

Household Characteristics	Households with Children				Households without Children							RSE Row Factor
	Total	Age of Oldest Child			Total	One Adult, Age of Householder			Two or More Adults, Age of Householder			
		Under 7 Years	7 to 15 Years	16 or 17 Years		Under 35 Years	35 to 59 Years	60 Years or Over	Under 35 Years	35 to 59 Years	60 Years or Over	
RSE Column Factor	0.576	0.869	0.791	1.175	0.599	1.590	1.355	1.680	1.054	0.929	0.991	
Number of Drivers (fall 1987)												
1	12,604	13,279	12,709	Q	10,507	13,898	12,641	7,143	Q	11,205	7,650	8.62
2	21,277	21,341	21,419	19,829	18,140	NC	NC	NC	20,075	20,578	14,580	4.51
3	29,734	Q	28,194	31,328	27,034	NC	NC	NC	19,728	29,853	25,043	8.98
4 or More	37,380	Q	32,276	39,178	35,699	NC	NC	NC	Q	37,409	Q	8.85
Average Number of Vehicles per Household per year												
Part-Year Vehicle	6,006	Q	Q	Q	4,802	Q	Q	Q	Q	Q	Q	49.07
Only 1	11,961	11,938	12,046	Q	9,683	12,811	10,699	6,511	12,574	11,650	8,536	7.40
Between 1 and 2	17,484	17,580	15,788	20,679	16,712	Q	Q	Q	18,265	16,250	17,720	9.81
Only 2	23,265	23,835	22,712	24,057	18,170	Q	17,357	Q	22,682	19,741	14,904	5.26
Between 2 and 3	26,612	27,464	25,860	27,314	24,221	Q	Q	NC	27,418	25,638	18,339	8.11
Only 3	32,461	Q	32,562	37,173	26,583	NC	Q	NC	Q	30,266	20,940	9.46
Between 3 and 4	37,875	Q	34,392	43,585	35,737	NC	NC	NC	Q	37,786	Q	10.63
4 or More	46,239	Q	Q	49,140	38,899	Q	Q	NC	Q	41,819	Q	10.56

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes. • Households with Children include members under age 18 years old unless the member is the householder or spouse.

• Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 18. U.S. Average Vehicle Miles Traveled by Vehicle Fuel Efficiency Category, 1988
(Miles per Vehicle)

Household and Vehicle Characteristics	All Fuel Efficiency Categories	Fuel Efficiency (miles per gallon)						RSE Factor
		10.9 or Less	11 to 12.9	13 to 15.9	16 to 18.9	19 to 21.9	22 or More	
RSE Column Factor	0.470	1.059	1.748	1.948	1.040	0.837	0.568	
Household Characteristics								
Total	10,246	5,584	7,682	8,882	10,063	11,836	12,708	3.09
Census Region and Division								
Northeast	10,311	5,186	7,312	8,204	10,051	11,024	12,404	6.45
New England	10,195	Q	Q	9,519	10,799	10,825	11,342	14.16
Middle Atlantic	10,349	5,144	7,591	7,787	9,822	11,089	12,771	7.25
Midwest	10,021	4,851	7,943	8,868	10,293	12,135	12,064	6.31
East North Central	10,124	4,909	7,397	8,769	10,436	12,306	12,031	6.75
West North Central	9,794	4,741	8,659	9,077	9,872	11,687	12,139	6.26
South	10,550	5,537	7,701	9,161	10,513	12,303	13,545	5.86
South Atlantic	10,701	5,448	6,420	8,824	10,110	12,950	13,507	7.34
East South Central	10,357	5,810	8,034	10,164	10,104	10,681	13,502	12.42
West South Central	10,412	5,472	9,914	9,121	11,232	12,145	13,723	11.00
West	9,980	6,427	7,531	8,943	8,977	11,396	12,631	6.71
Mountain	9,887	6,247	8,261	8,744	9,134	11,072	12,658	12.20
Pacific	10,013	6,496	7,246	9,035	8,928	11,465	12,621	7.83
Metropolitan Status								
Metropolitan	10,278	5,470	7,685	8,817	9,842	11,768	12,643	3.40
Central City	9,720	5,548	7,365	8,401	9,519	11,001	11,952	5.96
Outside Central City	10,565	5,425	7,855	9,054	9,997	12,155	12,986	4.05
Nonmetropolitan	10,137	5,847	7,675	9,084	10,872	12,097	12,985	6.73
Household Size								
1 Person	9,243	4,739	6,259	8,323	8,397	10,281	12,443	9.04
2 Persons	9,381	5,057	6,941	7,453	9,696	11,192	11,948	5.47
3 Persons	11,180	6,298	8,650	10,229	10,595	12,395	13,233	6.20
4 Persons	11,005	6,100	7,594	9,829	10,689	12,708	13,278	6.07
5 or More Persons	11,062	6,607	9,258	9,838	11,204	12,934	13,041	6.85
Household Composition								
Households with Children	11,268	6,381	8,527	9,986	11,252	12,797	13,386	3.90
Age of Oldest Child								
Under 7 Years	11,322	7,333	8,187	9,440	10,586	12,252	13,611	7.74
7 to 15 Years	10,947	5,839	8,470	10,326	11,619	12,725	12,845	5.79
16 or 17 Years	11,865	6,717	9,049	9,846	11,311	13,557	13,974	8.22
Households without Children	9,548	5,128	7,131	8,104	9,407	11,133	12,182	4.16
One Adult	9,243	4,739	6,259	8,323	8,397	10,281	12,443	9.04
Age of Householder								
Under 35 Years	12,052	Q	Q	Q	Q	11,410	13,870	15.27
35 to 59 Years	9,299	5,478	Q	7,581	9,474	10,640	12,793	14.59
60 Years or More	6,890	3,774	Q	6,733	7,022	8,469	9,365	16.03
Two or More Adults	9,637	5,260	7,352	8,033	9,635	11,375	12,099	4.87
Age of Householder								
Under 35 Years	11,414	6,908	Q	9,083	11,176	12,237	13,119	9.18
35 to 59 Years	10,238	5,483	7,736	8,883	10,511	12,110	12,497	6.70
60 Years or More	7,852	4,584	6,242	6,631	7,964	10,030	10,192	7.97
Origin of Householder								
White	10,182	5,498	7,621	8,903	9,998	11,817	12,632	3.26
Black	10,769	Q	Q	8,748	11,294	12,017	13,466	12.18
Other	10,860	Q	Q	Q	8,936	Q	13,086	16.50
Hispanic Descent								
Yes	10,476	Q	Q	8,795	9,163	11,943	13,282	16.65
No	10,233	5,530	7,595	8,888	10,109	11,830	12,677	3.17

See footnote at end of table

Table 18. U.S. Average Vehicle Miles Traveled by Vehicle Fuel Efficiency Category, 1988 (Continued)
(Miles per Vehicle)

Household and Vehicle Characteristics	All Fuel Efficiency Categories	Fuel Efficiency (miles per gallon)						Miles per Vehicle
		10.9 or Less	11 to 12.9	13 to 15.9	16 to 18.9	19 to 21.9	22 or More	
1987 Family Income								
Less than \$10,000	8,377	5,393	6,124	7,674	8,681	10,020	11,245	12.65
\$10,000 to \$14,999	9,053	5,371	7,158	8,466	9,219	10,520	12,376	11.14
\$15,000 to \$19,999	9,884	5,388	8,836	9,499	9,372	10,876	12,048	10.82
\$20,000 to \$24,999	10,193	6,260	7,435	9,386	9,928	10,919	12,773	8.16
\$25,000 to \$34,999	10,173	5,265	7,845	9,011	10,775	11,470	12,357	15.22
\$35,000 to \$49,999	11,053	6,168	8,102	9,126	10,204	12,877	13,426	6.93
\$50,000 to \$74,999	11,026	4,922	8,732	9,334	10,585	12,400	13,026	8.78
\$75,000 or More	11,538	Q	Q	8,242	10,673	13,538	13,298	11.20
Below 100% of Poverty	8,805	5,869	6,799	8,330	Q	Q	11,919	13.87
Below 125% of Poverty	9,089	5,831	7,086	8,651	9,226	10,319	12,052	10.52
Number of Drivers (fall 1987)								
1	9,144	4,717	6,405	8,123	8,556	10,566	12,255	7.66
2	10,243	5,845	7,755	8,662	10,376	11,816	12,526	9.93
3	11,042	5,510	8,655	9,798	10,823	12,800	13,283	7.09
4 or More	11,530	6,688	8,101	10,740	10,055	13,171	13,788	8.57
Average Number of Vehicles per Household per year								
Part-Year Vehicle	9,546	Q	Q	Q	Q	Q	Q	27.66
Only 1	10,167	5,758	6,663	8,579	9,060	11,243	12,608	8.24
Between 1 and 2	11,262	6,213	10,434	10,132	11,405	11,927	13,035	10.48
Only 2	10,123	5,563	7,430	8,137	10,218	11,532	12,771	4.69
Between 2 and 3	10,492	5,838	7,729	9,625	10,218	12,477	12,175	7.53
Only 3	9,664	4,819	7,500	8,070	9,683	12,073	12,666	9.13
Between 3 and 4	10,730	6,313	Q	9,670	9,351	13,308	13,529	9.40
4 or More	9,914	5,013	6,742	10,409	10,716	11,882	12,914	10.29
Vehicle Characteristics								
Model Year								
1988 or 1989	12,920	Q	Q	Q	13,037	12,822	13,734	10.64
1987	13,408	Q	Q	Q	9,833	13,345	14,482	8.71
1986	12,570	Q	Q	10,625	10,825	13,076	13,151	8.31
1985	12,074	Q	Q	12,911	9,609	12,453	13,244	7.99
1984	11,506	Q	Q	9,059	10,827	11,885	12,408	8.91
1983	10,610	Q	Q	6,767	10,700	11,685	11,876	10.14
1982	10,752	Q	Q	Q	11,219	10,412	11,706	9.16
1981	10,021	Q	Q	8,389	8,507	10,826	12,413	10.19
1979 or 1980	9,480	4,925	7,932	9,213	10,469	9,966	12,019	8.76
1977 or 1978	8,715	6,428	8,024	8,776	11,601	Q	9,400	8.54
1975 or 1976	7,706	4,668	8,866	9,476	8,871	Q	Q	10.55
1974 or Earlier	6,271	6,016	5,887	7,030	6,391	8,682	Q	11.22
Type of Vehicle								
Passenger Car	10,372	5,426	6,656	7,887	9,730	11,618	12,684	3.78
Mini Van	12,650	Q	Q	Q	10,463	13,584	Q	12.72
Jeep-Like Vehicle	11,843	5,236	10,787	13,528	12,463	14,795	Q	11.20
Large Van	9,774	6,590	9,932	11,114	Q	Q	Q	8.26
Pickup Truck	9,433	5,574	8,429	10,108	10,821	11,496	12,663	6.57
Other	4,862	5,034	NC	NC	NC	NC	NC	31.93
Engine Size (liters)								
2.49 or Less	11,303	Q	Q	4,873	7,498	9,510	12,448	8.74
2.50 to 3.49	11,440	Q	Q	7,030	9,334	12,310	13,527	6.72
3.50 to 4.49	9,637	3,783	4,329	7,269	9,985	12,286	15,525	8.22
4.50 or Greater	9,067	5,738	8,353	9,806	11,372	15,161	Q	4.14

See footnote at end of table

Table 18. U.S. Average Vehicle Miles Traveled by Vehicle Fuel Efficiency Category, 1988 (Continued)
(Miles per Vehicle)

Household and Vehicle Characteristics	All Fuel Efficiency Categories	Fuel Efficiency (miles per gallon)						RSE Row Factor
		10.9 or Less	11 to 12.9	13 to 15.9	16 to 18.9	19 to 21.9	22 or More	
RSE Column Factor:	0.470	1.828	1.748	1.348	1.049	0.832	0.565	
Number of Cylinders								
4	11,269	Q	Q	4,944	7,400	9,584	12,407	6.45
6	10,539	3,730	4,689	7,846	9,942	12,694	16,099	6.12
8	9,009	5,771	8,374	9,681	11,166	15,050	Q	4.25
Other	11,340	NC	NC	Q	Q	Q	Q	34.46
Type of Transmission								
Automatic	10,116	5,783	7,913	9,099	10,244	12,037	12,967	3.31
Manual Shift	10,572	4,543	6,618	7,662	9,359	11,230	12,439	7.12
Type of Drive								
Front-Wheel	11,831	Q	Q	8,694	8,956	10,800	12,780	6.16
Rear-Wheel	9,345	5,575	7,344	8,595	10,147	12,352	12,484	3.85
4-Wheel	10,651	5,301	10,638	11,918	10,994	13,144	12,751	8.64
Type of Fuel System								
Carburetor	9,620	5,643	7,706	8,903	9,834	11,555	12,139	3.55
Fuel Injection	12,248	Q	7,159	8,341	10,816	12,386	13,707	5.79
Diesel Engine	11,166	Q	Q	Q	Q	Q	11,703	12.77
Type of Fuel Purchased								
Motor Gasoline	10,230	5,535	7,664	8,847	10,071	11,826	12,733	3.11
Unleaded	10,686	5,184	7,875	9,035	10,352	11,880	12,855	3.39
Regular Grade	10,543	5,661	8,291	9,304	10,114	11,627	12,610	4.11
Intermediate Grade	11,312	Q	Q	8,519	11,278	12,387	13,917	11.47
Premium Grade	10,872	3,963	7,005	8,494	10,608	12,231	13,172	5.87
Leaded	7,353	5,979	7,063	7,934	7,630	11,015	9,225	10.63
Diesel Fuel	11,166	Q	Q	Q	Q	Q	11,703	12.77
Type of Primary Service								
Full-Service Pumps	9,444	3,635	6,870	8,052	8,963	10,980	11,889	7.48
Self or Mini-Service Pumps	10,396	5,867	7,820	9,058	10,247	12,036	12,900	3.37
Both Equally	10,287	Q	Q	8,139	11,128	11,242	12,104	14.53
Vehicle Used on the Job								
Yes	12,383	6,863	9,907	10,837	12,881	13,445	14,644	7.03
No	9,966	5,434	7,387	8,636	9,743	11,605	12,432	3.32

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 19. U.S. Vehicle Fuel Consumption by Vehicle Type, 1988
(Billion Gallons)

Household and Vehicle Characteristics	All Vehicle Types	Type of Vehicle									RSE Row Factor
		Passenger Cars				Mini Van	Jeep or Similar	Large Van	Pickup Truck	Other	
		All	Sedan	Two-Seat Car	Station Wagon						
RSE Column Factor:	0.330	0.386	0.380	1.737	1.123	1.751	1.472	1.525	0.742	3.735	
Household Characteristics											
Total	82.4	57.5	50.7	2.3	4.5	1.4	3.7	3.5	15.9	0.4	7.86
Census Region and Division											
Northeast	14.0	11.0	9.8	.2	1.0	.2	.5	.7	1.6	Q	17.62
New England	3.4	2.4	2.1	Q	.2	Q	Q	Q	.5	Q	27.96
Middle Atlantic	10.6	8.6	7.7	Q	.8	.1	.2	.5	1.1	NC	18.12
Midwest	20.8	14.7	12.7	.5	1.5	.4	.9	1.0	3.7	Q	13.72
East North Central	14.3	10.3	9.0	.4	1.0	.3	.6	.6	2.4	Q	17.32
West North Central	6.5	4.4	3.7	Q	.5	Q	.2	.4	1.3	Q	21.87
South	29.6	20.3	18.3	.9	1.1	.6	1.3	1.1	6.4	Q	13.45
South Atlantic	14.6	10.4	9.3	.4	.7	.4	.6	.6	2.5	Q	19.46
East South Central	5.6	4.1	3.6	.2	Q	Q	Q	.1	1.2	NC	26.34
West South Central	9.4	5.8	5.3	Q	.2	Q	.5	.3	2.7	Q	26.99
West	18.1	11.5	10.0	.7	.9	.4	1.0	.8	4.2	Q	16.17
Mountain	4.7	2.7	2.4	.1	.2	.1	.5	Q	1.3	Q	23.88
Pacific	13.3	8.8	7.6	.5	.7	.3	.6	.6	2.9	Q	20.04
Metropolitan Status											
Metropolitan	62.6	45.2	39.6	2.0	3.6	1.2	2.7	2.8	10.4	.3	8.65
Central City	20.5	15.3	13.6	.7	1.0	.4	.8	1.0	2.9	Q	15.02
Outside Central City	42.2	29.9	26.0	1.3	2.7	.8	1.9	1.8	7.5	.2	10.74
Nonmetropolitan	19.8	12.3	11.1	.3	.9	.2	1.0	.7	5.5	Q	15.32
Household Size											
1 Person	9.9	7.8	7.2	.4	.2	Q	.4	Q	1.4	Q	21.87
2 Persons	26.6	18.4	16.5	.6	1.3	.3	1.1	.9	5.6	Q	14.54
3 Persons	17.2	12.0	10.8	.4	.7	.2	.8	.8	3.4	Q	17.44
4 Persons	15.9	10.8	9.2	.5	1.2	.5	.8	.7	3.0	Q	16.56
5 or More Persons	12.8	8.6	7.1	.4	1.1	.4	.5	.8	2.5	Q	19.37
Household Composition											
Households with Children	36.4	24.8	21.2	.8	2.8	1.1	1.8	2.0	6.7	Q	11.95
Age of Oldest Child											
Under 7 Years	10.2	7.1	6.1	Q	.8	.2	.5	.5	1.9	Q	21.85
7 to 15 Years	17.5	11.5	9.8	.3	1.4	.6	.9	1.0	3.4	Q	17.63
16 or 17 Years	8.7	6.2	5.2	.3	.6	.2	.4	.5	1.4	NC	25.02
Households without children	46.0	32.7	29.6	1.5	1.7	.4	1.9	1.5	9.2	.3	11.15
One Adult	9.9	7.8	7.2	.4	.2	Q	.4	Q	1.4	Q	21.87
Age of Householder											
Under 35 Years	3.4	2.6	2.4	Q	Q	Q	Q	Q	.5	NC	45.76
35 to 59 Years	3.7	2.8	2.6	Q	Q	NC	Q	Q	.6	NC	35.78
60 Years or More	2.9	2.4	2.2	Q	.1	NC	Q	Q	.4	Q	36.85
Two or More Adults	36.1	25.0	22.4	1.0	1.5	.4	1.5	1.2	7.8	.3	12.34
Age of Householder											
Under 35 Years	8.3	5.7	5.2	Q	.3	Q	.5	.2	1.8	Q	26.10
35 to 59 Years	16.7	10.9	9.6	.6	.7	.2	.8	.6	4.0	Q	17.92
60 Years or More	11.1	8.3	7.6	.1	.5	.1	Q	.4	1.9	Q	20.76
Origin of Householder											
White	73.5	50.3	44.2	2.0	4.2	1.3	3.5	3.1	14.9	.4	8.36
Black	6.2	5.1	4.7	Q	.2	.1	Q	.2	.6	NC	38.04
Other	2.8	2.1	1.9	Q	.2	Q	Q	Q	.5	NC	51.07
Hispanic Descent											
Yes	4.5	3.0	2.7	.2	.2	Q	Q	Q	.8	Q	37.75
No	78.0	54.5	48.1	2.1	4.3	1.3	3.4	3.3	15.1	.4	8.19

See footnote at end of table

Table 19. U.S. Vehicle Fuel Consumption by Vehicle Type, 1988 (Continued)
(Billion Gallons)

Household and Vehicle Characteristics	All Vehicle Types	Type of Vehicle									RSE Row Factor
		Passenger Cars				Mini Van	Jeep or Similar	Large Van	Pickup Truck	Other	
		All	Sedan	Two-Seat Car	Station Wagon						
RSE Column Factor:	0.330	0.366	0.390	1.737	1.123	1.751	1.472	1.525	0.742	3.735	
1987 Family Income											
Less than \$10,000	6.6	4.8	4.5	Q	0.2	Q	Q	0.3	1.3	Q	33.36
\$10,000 to \$14,999	9.0	6.7	5.9	Q	.6	Q	Q	.4	1.8	Q	25.31
\$15,000 to \$19,999	7.3	4.9	4.5	Q	.3	Q	0.3	.3	1.7	Q	29.45
\$20,000 to \$24,999	8.5	5.9	5.3	Q	.4	Q	.3	.4	1.8	Q	24.41
\$25,000 to \$34,999	16.4	11.1	9.8	0.4	.9	0.2	.9	.7	3.4	Q	16.44
\$35,000 to \$49,999	16.5	10.9	9.6	.4	1.0	.4	.7	1.0	3.3	Q	16.07
\$50,000 to \$74,999	11.8	8.3	7.2	.5	.6	.3	.8	.3	1.9	Q	18.92
\$75,000 or More	6.3	4.9	4.0	.3	.6	Q	.3	.1	.7	NC	30.66
Below 100% of Poverty	5.0	3.5	3.1	Q	Q	Q	Q	.3	1.2	Q	36.66
Below 125% of Poverty	8.9	6.3	5.7	.2	.4	Q	Q	.4	1.9	Q	27.60
Number of Drivers (fall 1987)											
1	14.4	11.3	10.4	.5	.4	Q	.5	.3	2.1	Q	20.28
2	46.7	31.2	27.5	1.0	2.8	.9	2.2	2.4	9.7	0.3	10.55
3	13.0	9.1	8.1	.4	.6	.2	.6	.5	2.6	Q	19.15
4 or More	8.0	5.6	4.6	.4	.6	Q	.3	Q	1.5	Q	25.77
Average Number of Vehicles per Household per year											
Part-Year Vehicle	1.2	1.1	1.0	Q	Q	Q	Q	NC	Q	NC	76.40
Only 1	12.9	10.8	10.0	.3	.5	Q	.4	Q	1.3	NC	21.51
Between 1 and 2	8.5	6.2	5.6	Q	.5	Q	.5	Q	1.4	Q	25.03
Only 2	26.7	17.8	15.6	.5	1.7	.8	1.2	1.2	5.7	Q	12.52
Between 2 and 3	11.4	7.4	6.4	.4	.7	.2	.6	.6	2.5	Q	19.90
Only 3	9.5	6.4	5.5	.3	.5	.1	.3	.4	2.2	Q	24.19
Between 3 and 4	5.8	3.8	3.3	.2	.3	Q	.4	.3	1.2	Q	27.70
4 or More	6.4	4.0	3.4	.3	.3	Q	.3	.5	1.5	Q	29.66
Vehicle Characteristics											
Model Year											
1988 or 1989	4.2	2.8	2.5	.2	.1	.2	.3	Q	.7	Q	29.14
1987	7.0	4.6	3.9	.2	.4	.3	.6	.2	1.3	NC	21.83
1986	8.9	5.8	5.3	Q	.3	.5	.6	.3	1.7	Q	22.78
1985	7.5	5.2	4.6	.2	.5	.2	.4	.2	1.4	Q	22.12
1984	7.3	5.2	4.6	Q	.4	Q	.6	.3	1.1	Q	20.70
1983	4.1	3.2	3.0	Q	.2	Q	Q	.2	.5	Q	27.53
1982	4.1	3.2	2.7	Q	.3	NC	Q	.2	.7	NC	28.43
1981	4.2	3.2	2.9	Q	.2	NC	Q	.1	.7	NC	31.14
1979 or 1980	9.7	7.2	6.2	.4	.6	NC	.3	.5	1.7	Q	19.91
1977 or 1978	9.4	6.6	5.7	Q	.7	NC	Q	.7	1.8	Q	21.14
1975 or 1976	5.9	4.0	3.5	Q	Q	Q	.1	.3	1.4	Q	27.30
1974 or Earlier	10.2	6.5	5.8	.3	.4	Q	Q	.5	2.8	Q	26.70
Fuel Efficiency (miles per gallon)											
10.9 or Less	72.9	53.3	46.8	2.2	4.3	1.4	3.2	2.4	12.6	NC	8.03
11 to 12.9	8.0	3.9	3.4	Q	.4	Q	.8	.7	2.6	NC	24.96
13 to 15.9	14.9	8.6	7.3	.4	.8	Q	1.0	1.1	4.0	NC	19.10
16 to 18.9	13.9	10.6	9.4	.5	.8	.3	.5	.3	2.1	NC	17.87
19 to 21.9	15.0	11.2	9.8	.4	1.0	.8	.7	.2	2.1	NC	18.67
22 or More	21.1	18.9	16.9	.7	1.3	.2	.2	Q	1.8	NC	14.66
Engine Size (liters)											
2.49 or Less	22.0	18.5	16.0	1.0	1.5	.3	.4	Q	2.8	NC	13.96
2.50 to 3.49	12.1	8.6	7.3	.5	.8	.9	1.1	Q	1.5	NC	16.83
3.50 to 4.49	11.5	9.8	8.9	Q	.7	.2	.3	.2	1.0	Q	19.55
4.50 or Greater	36.7	20.6	18.5	.6	1.5	Q	1.8	3.1	10.7	.4	12.33

See footnote at end of table

Table 19. U.S. Vehicle Fuel Consumption by Vehicle Type, 1988 (Continued)
(Billion Gallons)

Household and Vehicle Characteristics	All Vehicle Types	Type of Vehicle									RSE Row Factor
		Passenger Cars				Mini Van	Jeep or Similar	Large Van	Pickup Truck	Other	
		All	Sedan	Two-Seat Car	Station Wagon						
RSE Column Factor:	0.330	0.986	0.390	1.737	1.123	1.751	1.472	1.525	0.742	3.735	
Number of Cylinders											
4	25.0	20.3	17.9	0.9	1.6	0.8	0.6	Q	3.2	NC	13.14
6	20.5	14.5	12.8	.5	1.3	.6	1.3	0.7	3.4	Q	14.90
8	36.4	22.2	19.9	.7	1.7	Q	1.7	2.7	9.4	0.4	12.62
Other .....	.5	.5	.2	.3	NC	Q	NC	NC	NC	NC	60.22
Type of Transmission											
Automatic	62.3	46.1	41.3	1.1	3.7	1.3	2.3	3.2	9.0	.4	9.42
Manual Shift	20.1	11.4	9.5	1.2	.8	.2	1.3	.3	6.9	NC	16.06
Type of Drive											
Front-Wheel	23.7	22.0	20.0	.5	1.6	.7	Q	.2	.7	NC	15.36
Rear-Wheel	51.6	34.9	30.3	1.8	2.7	.8	.7	3.1	11.8	.4	10.54
4-Wheel	7.1	.6	.4	Q	.2	NC	2.9	Q	3.4	NC	26.34
Type of Fuel System											
Carburetor	62.3	41.3	36.4	1.5	3.4	.9	2.9	3.3	13.6	.4	8.99
Fuel Injection	19.0	15.5	13.7	.8	1.0	.6	.7	.2	2.0	Q	15.23
Diesel Engine	1.1	.7	.7	NC	Q	NC	Q	Q	.3	Q	58.66
Type of Fuel Purchased											
Motor Gasoline	81.1	56.8	50.1	2.3	4.5	1.4	3.6	3.5	15.4	.4	7.79
Unleaded	69.9	51.2	45.1	2.0	4.1	1.4	3.1	2.5	11.5	Q	8.15
Regular Grade	45.1	31.3	27.6	1.0	2.7	.9	1.9	2.2	8.6	Q	10.24
Intermediate Grade	4.4	3.4	2.9	Q	.3	.1	Q	Q	.7	NC	32.09
Premium Grade	20.4	16.5	14.6	.8	1.1	.4	1.1	.3	2.1	Q	16.24
Leaded	11.1	5.6	5.0	.3	.3	Q	.4	1.0	3.9	.2	21.47
Diesel Fuel	1.1	.7	.7	NC	Q	NC	Q	Q	.3	Q	58.66
Type of Primary Service											
Full-Service Pumps	11.0	8.9	7.9	.3	.7	Q	.3	.2	1.5	NC	24.06
Self or Mini-Service Pumps	68.1	46.1	40.7	1.9	3.5	1.4	3.1	3.1	14.1	.3	8.90
Both Equally	3.1	2.4	2.1	Q	.3	Q	.2	.1	.3	Q	39.93
Vehicle Used on the Job											
Yes	11.4	6.3	5.5	.2	.6	.4	.7	.9	3.1	NC	20.46
No	71.0	51.2	45.2	2.1	3.9	1.0	3.0	2.6	12.8	.4	8.24

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 20. U.S. Average Vehicle Miles Traveled by Vehicle Type, 1988
(Miles per Vehicle)

Household and Vehicle Characteristics	All Vehicle Types	Type of Vehicle									RSE Row Factor
		Passenger Cars				Mini Van	Jeep or Similar	Large Van	Pickup Truck	Other	
		All	Sedan	Two Seat Car	Station Wagon						
RSE Column Factor	0.920	0.356	0.378	2.205	1.082	1.515	1.383	1.306	0.742	4.889	
Household Characteristics											
Total	10,246	10,372	10,410	9,679	10,328	12,650	11,843	9,774	9,433	4,862	4.78
Census Region and Division											
Northeast	10,311	10,423	10,320	Q	11,696	Q	Q	11,108	9,090	Q	8.87
New England	10,195	10,204	10,299	Q	Q	Q	Q	Q	9,273	Q	20.80
Middle Atlantic	10,349	10,489	10,326	Q	12,780	Q	Q	Q	9,008	NC	8.10
Midwest	10,021	10,181	10,231	8,433	10,498	Q	11,102	10,158	9,139	Q	7.69
East North Central	10,124	10,331	10,319	Q	11,126	Q	10,992	10,675	8,969	Q	8.87
West North Central	9,794	9,839	10,027	Q	9,439	Q	Q	Q	9,475	Q	11.24
South	10,550	10,622	10,791	9,333	9,244	15,066	12,737	9,871	9,776	Q	8.84
South Atlantic	10,701	11,044	11,212	Q	9,701	Q	12,495	Q	8,736	Q	12.68
East South Central	10,357	10,505	10,703	Q	Q	Q	Q	Q	9,812	NC	20.98
West South Central	10,412	9,937	10,094	Q	Q	Q	14,173	Q	11,072	Q	12.23
West	9,980	10,152	10,085	11,443	10,025	11,907	12,070	8,249	9,344	Q	9.94
Mountain	9,887	10,348	10,304	Q	Q	Q	10,504	Q	8,786	Q	16.03
Pacific	10,013	10,091	10,016	Q	9,920	Q	Q	7,961	9,588	Q	11.55
Metropolitan Status											
Metropolitan	10,278	10,355	10,398	9,663	10,288	12,708	11,814	9,740	9,566	Q	5.87
Central City	9,720	9,715	9,811	8,550	9,326	12,543	12,507	9,206	9,014	Q	8.36
Outside Central City	10,565	10,704	10,723	10,374	10,676	12,786	11,519	10,049	9,785	Q	6.74
Nonmetropolitan	10,137	10,439	10,456	Q	10,512	Q	11,937	9,926	9,179	Q	9.52
Household Size											
1 Person	9,243	9,309	9,391	Q	Q	Q	Q	Q	8,481	Q	13.09
2 Persons	9,381	9,502	9,576	7,963	9,370	Q	11,382	8,137	8,826	Q	6.95
3 Persons	11,180	11,342	11,440	Q	9,876	Q	13,277	10,043	10,513	Q	9.32
4 Persons	11,005	11,171	11,129	10,441	11,838	14,079	11,375	12,323	9,617	Q	8.91
5 or More Persons	11,062	11,329	11,408	9,789	11,510	12,956	Q	10,418	9,916	Q	9.44
Household Composition											
Households with Children	11,268	11,538	11,607	10,388	11,399	13,327	12,494	11,202	9,714	Q	6.00
Age of Oldest Child											
Under 7 Years	11,322	11,541	11,658	Q	10,828	Q	Q	Q	9,939	Q	10.46
7 to 15 Years	10,947	11,136	11,258	Q	10,865	13,342	12,256	10,721	9,695	Q	8.83
16 or 17 Years	11,865	12,328	12,222	Q	13,645	Q	Q	11,514	9,462	NC	11.04
Households without children	9,548	9,617	9,675	9,300	8,940	11,118	11,278	8,204	9,240	Q	6.79
One Adult	9,243	9,309	9,391	Q	Q	Q	Q	Q	8,481	Q	13.09
Age of Householder											
Under 35 Years	12,052	12,191	12,371	Q	Q	Q	Q	Q	Q	NC	18.84
35 to 59 Years	9,299	9,806	9,894	Q	Q	NC	Q	Q	7,364	NC	25.24
60 Years or More	6,890	6,742	6,750	Q	Q	NC	Q	Q	Q	Q	19.77
Two or More Adults	9,637	9,717	9,770	9,160	9,376	Q	11,119	8,185	9,384	Q	7.23
Age of Householder											
Under 35 Years	11,414	11,206	11,457	Q	Q	Q	Q	Q	12,064	Q	12.27
35 to 59 Years	10,238	10,311	10,311	10,143	10,462	Q	10,451	8,287	10,275	Q	10.15
60 Years or More	7,852	8,162	8,205	Q	8,075	Q	Q	Q	6,561	Q	11.36
Origin of Householder											
White	10,182	10,297	10,340	9,524	10,255	12,621	11,655	9,632	9,473	4,862	5.09
Black	10,769	11,034	10,960	Q	Q	Q	Q	Q	Q	NC	19.02
Other	10,860	10,738	10,823	Q	Q	Q	Q	Q	Q	NC	26.13
Hispanic Descent											
Yes	10,476	10,336	10,463	Q	Q	Q	Q	Q	9,830	Q	24.03
No	10,233	10,374	10,407	9,601	10,423	12,119	11,836	9,792	9,412	4,682	4.92

See footnote at end of table

Table 20. U.S. Average Vehicle Miles Traveled by Vehicle Type, 1988 (Continued)
(Miles per Vehicle)

Household and Vehicle Characteristics	Type of Vehicle										RSE Row Factor
	All Vehicle Types	Passenger Cars					Jeep or Similar	Large Van	Pickup Truck	Other	
		All	Sedan	Two Seat Car	Station Wagon	Mini Van					
RSE Column Factor	0.320	0.356	0.378	2.205	1.992	1.515	1.393	1.306	0.742	4.859	
1987 Family Income											
Less than \$10,000	8,377	8,589	8,764	Q	Q	Q	Q	Q	7,504	Q	19.70
\$10,000 to \$14,999	9,053	9,438	9,415	Q	10,175	Q	Q	Q	7,574	Q	15.53
\$15,000 to \$19,999	9,884	9,830	9,786	Q	Q	Q	Q	Q	10,044	Q	15.49
\$20,000 to \$24,999	10,193	10,585	10,418	Q	11,549	Q	Q	Q	8,687	Q	12.64
\$25,000 to \$34,999	10,173	10,385	10,536	Q	9,273	Q	11,638	8,598	9,556	Q	9.56
\$35,000 to \$49,999	11,053	10,986	11,113	Q	10,500	12,116	12,592	11,989	10,907	Q	8.28
\$50,000 to \$74,999	11,026	11,000	11,116	10,855	9,805	Q	12,851	Q	10,404	Q	9.55
\$75,000 or More	11,538	11,540	11,447	Q	14,050	Q	Q	Q	10,192	NC	17.48
Below 100% of Poverty	8,805	9,009	9,233	Q	Q	Q	Q	Q	8,136	Q	19.21
Below 125% of Poverty	9,089	9,276	9,422	Q	Q	Q	Q	Q	8,189	Q	15.25
Number of Drivers (fall 1987)											
1	9,144	9,275	9,391	Q	7,178	Q	Q	Q	8,055	Q	11.74
2	10,243	10,402	10,475	8,944	10,262	12,730	11,756	9,671	9,369	Q	5.80
3	11,042	11,132	11,178	9,850	11,685	Q	12,408	11,555	10,688	Q	10.31
4 or More	11,530	11,816	11,633	Q	13,123	Q	Q	Q	10,187	Q	11.42
Average Number of Vehicles per Household per year											
Part-Year Vehicle	9,546	9,730	10,001	Q	Q	Q	Q	NC	Q	NC	39.50
Only 1	10,167	10,011	10,067	Q	8,867	Q	Q	Q	10,449	NC	11.05
Between 1 and 2	11,262	11,159	11,324	Q	Q	Q	Q	Q	10,968	Q	13.96
Only 2	10,123	10,354	10,374	Q	10,250	13,191	10,966	10,297	8,865	Q	6.95
Between 2 and 3	10,492	10,540	10,399	Q	12,868	Q	12,270	9,186	10,372	Q	10.65
Only 3	9,664	9,940	10,073	Q	10,121	Q	Q	8,082	9,003	Q	15.81
Between 3 and 4	10,730	10,903	10,915	Q	Q	Q	Q	Q	10,727	Q	15.71
4 or More	9,914	10,489	10,574	Q	Q	Q	Q	Q	8,138	Q	17.09
Vehicle Characteristics											
Model Year											
1988 or 1989	12,920	12,780	12,653	Q	Q	Q	Q	Q	12,403	Q	15.43
1987	13,408	13,635	13,787	Q	12,486	Q	14,457	Q	12,406	NC	10.47
1986	12,570	12,277	12,181	Q	Q	15,061	Q	Q	13,183	Q	9.10
1985	12,074	12,197	12,249	Q	11,726	Q	Q	Q	11,864	Q	10.89
1984	11,506	11,210	11,241	Q	10,716	Q	Q	Q	12,554	Q	10.67
1983	10,610	10,612	10,605	Q	Q	Q	Q	Q	10,151	Q	14.64
1982	10,752	11,058	10,917	Q	13,189	NC	Q	Q	9,435	NC	13.33
1981	10,021	10,162	10,257	Q	Q	NC	Q	Q	9,180	NC	15.51
1979 or 1980	9,480	9,614	9,659	Q	10,425	NC	Q	Q	8,473	Q	12.17
1977 or 1978	8,715	8,720	8,924	Q	7,228	NC	Q	8,876	8,633	Q	13.15
1975 or 1976	7,706	8,061	8,034	Q	Q	Q	Q	Q	7,345	Q	22.86
1974 or Earlier	6,271	6,460	6,492	Q	Q	Q	Q	Q	5,881	Q	20.74
Fuel Efficiency (miles per gallon)											
10.9 or Less	5,584	5,426	5,463	Q	Q	Q	5,236	6,590	5,574	5,034	14.66
11 to 12.9	7,682	6,656	6,832	Q	6,347	Q	10,787	9,932	8,429	NC	15.70
13 to 15.9	8,882	7,887	7,921	Q	7,926	Q	13,528	11,114	10,108	NC	11.90
16 to 18.9	10,063	9,730	9,716	Q	10,445	10,463	12,463	Q	10,821	NC	9.68
19 to 21.9	11,836	11,618	11,477	Q	13,119	13,584	14,795	Q	11,496	NC	7.42
22 or More	12,708	12,684	12,771	12,090	11,938	Q	Q	Q	12,663	NC	5.29
Engine Size (liters)											
2.49 or Less	11,303	11,406	11,519	10,357	10,878	Q	Q	Q	10,463	NC	5.98
2.50 to 3.49	11,440	10,938	11,021	Q	10,529	13,936	13,428	Q	12,264	NC	9.14
3.50 to 4.49	9,637	9,884	9,950	Q	9,618	Q	Q	Q	7,759	Q	12.40
4.50 or Greater	9,067	9,032	9,003	Q	9,739	Q	11,046	10,042	8,815	4,817	7.53

See footnote at end of table

Table 20. U.S. Average Vehicle Miles Traveled by Vehicle Type, 1988 (Continued)
(Miles per Vehicle)

Household and Vehicle Characteristics	Type of Vehicle										RSE Row Factor
	All Vehicle Types	Passenger Cars									
		All	Sedan	Two Seat Car	Station Wagon	Mini Van	Jeep or Similar	Large Van	Pickup Truck	Other	
RSE Column Factor:	0.320	0.356	0.378	2.205	1.062	1.515	1.383	1.306	0.742	4.859	
Number of Cylinders											
4	11,269	11,308	11,373	10,991	10,755	13,169	12,232	Q	10,515	NC	6.56
6	10,539	10,492	10,562	Q	10,635	12,374	12,594	9,005	10,093	Q	8.16
8	9,009	9,044	9,033	Q	9,563	Q	10,916	9,940	8,619	4,817	7.59
Other	11,340	11,452	Q	Q	Q	Q	NC	NC	NC	NC	48.46
Type of Transmission											
Automatic	10,116	10,124	10,138	9,399	10,193	12,993	12,194	9,982	9,516	4,862	5.91
Manual Shift	10,572	11,165	11,351	9,907	10,780	Q	11,377	Q	9,350	NC	7.10
Type of Drive											
Front-Wheel	11,831	11,799	11,795	12,365	11,661	12,897	Q	Q	11,097	NC	7.18
Rear-Wheel	9,345	9,353	9,377	8,956	9,373	12,409	Q	9,352	9,166	4,862	6.44
4-Wheel	10,651	9,583	8,848	Q	Q	NC	11,759	Q	10,089	NC	13.80
Type of Fuel System											
Carburetor	9,620	9,721	9,747	8,738	9,939	13,213	11,072	9,370	8,978	Q	5.50
Fuel Injection	12,248	12,116	12,178	11,775	11,573	11,850	14,815	Q	12,630	Q	7.00
Diesel Engine	11,166	11,316	11,325	NC	Q	NC	Q	Q	Q	Q	17.69
Type of Fuel Purchased											
Motor Gasoline	10,230	10,358	10,395	9,679	10,322	12,650	11,809	9,646	9,410	5,133	4.78
Unleaded	10,686	10,678	10,703	10,434	10,525	12,862	12,554	10,718	10,164	Q	4.89
Regular Grade	10,543	10,538	10,517	10,691	10,703	12,242	12,040	10,922	10,117	Q	5.42
Intermediate Grade	11,312	10,954	11,193	Q	Q	Q	Q	Q	11,746	NC	16.85
Premium Grade	10,872	10,896	10,974	10,312	10,363	Q	13,286	Q	9,896	Q	9.50
Leaded	7,353	7,458	7,559	Q	Q	Q	Q	7,289	7,281	Q	16.07
Diesel Fuel	11,166	11,316	11,325	NC	Q	NC	Q	Q	Q	Q	17.69
Type of Primary Service											
Full-Service Pumps	9,444	9,364	9,216	Q	10,351	Q	Q	Q	9,386	NC	11.65
Self or Mini-Service Pumps	10,396	10,591	10,683	9,616	10,131	12,778	11,911	9,713	9,458	4,559	5.06
Both Equally	10,287	10,416	10,302	Q	Q	Q	Q	Q	Q	Q	21.92
Vehicle Used on the Job											
Yes	12,383	12,689	12,679	Q	12,684	Q	13,459	12,678	11,259	NC	11.00
No	9,966	10,125	10,170	9,437	10,006	12,490	11,547	9,052	9,079	4,862	4.92

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 21. Number of U.S. Households by Vehicle Fuel Expenditures, 1988
(Million Households)

Household Characteristics	All Expenditure Categories	Vehicle Fuel Expenditures (dollars per household)					Percent of Income for Vehicle Fuel					RSE Row Factor
		\$500 or Less	\$501 to \$1,000	\$1,001 to \$1,500	\$1,501 to \$2,000	\$2,001 or More	Less than 2	2 to 3.9	4 to 5.9	6 to 7.9	8 or More	
RSE Column Factor:	0.432	0.949	0.873	1.024	1.218	1.258	1.002	0.812	1.084	1.538	1.313	
Household Characteristics												
Total	81.3	19.6	27.2	19.3	8.5	6.7	21.8	27.3	14.3	6.8	11.1	5.40
Census Region and Division												
Northeast	15.2	4.2	5.3	3.3	1.2	1.2	5.0	6.4	2.1	.7	1.0	12.53
New England	3.6	1.0	1.3	.7	Q	.3	1.3	1.4	.6	Q	Q	24.04
Middle Atlantic	11.6	3.3	4.0	2.6	.9	.9	3.8	4.9	1.5	.6	.8	13.82
Midwest	20.4	5.0	6.7	4.9	2.1	1.7	5.0	6.8	4.0	2.1	2.5	10.13
East North Central	14.3	3.4	4.9	3.4	1.5	1.1	3.5	5.2	2.6	1.4	1.7	13.10
West North Central	6.1	1.6	1.7	1.5	.6	.6	1.5	1.7	1.4	.7	.8	16.70
South	28.3	6.1	9.5	7.3	3.1	2.2	6.2	8.6	5.6	2.8	5.2	9.69
South Atlantic	14.2	2.7	5.2	3.8	1.6	.9	3.4	4.6	2.6	1.4	2.3	14.13
East South Central	5.4	1.5	1.3	1.5	.6	.5	1.3	1.6	.9	Q	1.1	18.83
West South Central	8.7	1.9	3.0	2.0	.9	.8	1.5	2.4	2.0	.9	1.9	20.11
West	17.3	4.2	5.6	3.8	2.1	1.5	5.5	5.5	2.7	1.2	2.3	10.34
Mountain	4.3	1.1	1.2	1.1	.6	.4	1.0	1.1	.9	.4	.8	22.78
Pacific	13.0	3.2	4.4	2.7	1.5	1.2	4.5	4.4	1.8	.8	1.5	12.05
Metropolitan Status												
Metropolitan	63.0	15.6	21.1	14.8	6.5	4.9	18.6	22.5	10.2	4.4	7.3	6.29
Central City	24.0	7.7	8.7	4.8	1.5	1.2	7.5	8.1	3.8	1.5	3.1	11.26
Outside Central City	39.0	7.9	12.4	10.1	5.0	3.7	11.1	14.4	6.3	2.9	4.2	7.54
Nonmetropolitan	18.3	4.0	6.0	4.4	2.0	1.8	3.2	4.8	4.1	2.4	3.8	10.77
Household Size												
1 Person	16.9	8.8	5.7	2.0	Q	Q	5.7	5.0	2.7	1.2	2.3	13.13
2 Persons	28.6	6.8	11.5	6.5	2.5	1.3	8.5	9.9	4.5	2.0	3.7	9.35
3 Persons	14.2	2.0	4.0	4.5	2.2	1.5	3.3	4.9	3.0	.9	2.1	13.05
4 Persons	12.6	1.3	3.6	4.1	1.8	1.8	2.6	5.0	2.3	1.5	1.3	13.94
5 or More Persons	8.9	Q	2.4	2.1	1.8	1.8	1.7	2.6	1.8	1.1	1.8	15.06
Household Composition												
Households with Children	29.9	3.8	8.9	9.1	4.5	3.6	6.3	10.3	6.0	3.0	4.4	9.46
Age of Oldest Child												
Under 7 Years	9.5	1.3	3.4	2.9	1.4	.6	2.3	3.3	1.8	.8	1.3	17.22
7 to 15 Years	14.7	2.1	4.3	4.7	2.1	1.6	2.8	4.9	3.1	1.6	2.3	13.52
16 or 17 Years	5.7	Q	1.2	1.5	1.0	1.4	1.2	2.1	1.0	.6	.8	18.63
Households without children	51.3	15.8	18.3	10.1	4.1	3.1	15.4	17.1	8.3	3.8	6.8	7.31
One Adult	16.9	8.8	5.7	2.0	Q	Q	5.7	5.0	2.7	1.2	2.3	13.13
Age of Householder												
Under 35 Years	5.0	1.8	2.3	Q	Q	Q	1.5	1.6	.7	Q	Q	25.16
35 to 59 Years	5.3	2.1	2.1	1.0	Q	Q	1.9	1.6	.8	Q	Q	20.88
60 Years or More	6.7	5.0	1.2	Q	Q	Q	2.3	1.9	1.3	Q	.8	19.13
Two or More Adults	34.4	6.9	12.6	8.1	3.9	2.9	9.7	12.1	5.6	2.5	4.5	8.37
Age of Householder												
Under 35 Years	8.1	1.4	3.0	2.2	1.0	Q	2.2	2.5	1.6	Q	1.1	18.33
35 to 59 Years	12.8	1.2	4.1	3.6	1.9	2.0	3.4	4.9	2.0	.8	1.7	13.40
60 Years or More	13.5	4.3	5.4	2.3	1.0	.5	4.1	4.7	2.0	1.0	1.7	13.21
Origin of Householder												
White	71.5	16.7	23.6	17.5	7.7	6.0	19.7	24.3	12.5	5.8	9.3	5.67
Black	7.2	2.3	2.6	1.4	.5	.4	1.4	2.1	1.4	.7	1.6	24.98
Other	2.6	Q	1.0	Q	.3	Q	.7	1.0	Q	Q	Q	34.39
Hispanic Descent												
Yes	4.2	1.1	1.4	.6	.8	.4	1.1	1.3	.8	Q	Q	28.72
No	77.0	18.5	25.8	18.6	7.8	6.3	20.6	26.0	13.5	6.4	10.4	5.58

See footnote at end of table

**Table 21. Number of U.S. Households by Vehicle Fuel Expenditures,
1988 (Continued)**
(Million Households)

Household Characteristics	All Expenditure Categories	Vehicle Fuel Expenditures (dollars per household)					Percent of Income for Vehicle Fuel					RSE Row Factor
		\$500 or Less	\$501 to \$1,000	\$1,001 to \$1,500	\$1,501 to \$2,000	\$2,001 or More	Less than 2	2 to 3.9	4 to 5.9	6 to 7.9	8 or More	
RSE Column Factor:	0.432	0.949	0.873	1.024	1.218	1.258	1.002	0.812	1.064	1.538	1.313	
1987 Family Income												
Less than \$10,000	10.2	4.9	3.4	1.4	Q	Q	0.7	1.2	1.8	1.1	5.3	19.93
\$10,000 to \$14,999	11.8	4.9	3.9	1.9	0.6	0.6	1.8	3.1	2.5	1.5	3.0	15.05
\$15,000 to \$19,999	8.3	2.7	2.9	1.7	.6	.4	1.4	2.6	1.6	1.5	1.3	17.11
\$20,000 to \$24,999	8.6	2.1	3.1	2.0	.8	.6	1.7	2.6	2.3	1.1	.9	17.17
\$25,000 to \$34,999	16.0	2.8	6.2	4.3	1.7	1.0	3.8	7.3	3.4	.9	.5	12.77
\$35,000 to \$49,999	12.9	1.1	4.1	3.8	2.2	1.7	3.9	6.1	2.3	.5	Q	12.95
\$50,000 to \$74,999	8.8	.9	2.3	2.9	1.4	1.3	4.7	3.6	.4	Q	NC	15.07
\$75,000 or More	4.5	Q	1.2	1.2	.8	.9	3.7	.8	NC	NC	NC	22.32
Below 100% of Poverty	6.6	2.5	2.3	1.2	Q	Q	Q	Q	Q	Q	4.4	21.10
Below 125% of Poverty	11.3	4.4	3.8	1.8	.7	.5	.8	1.4	1.5	1.5	6.1	18.99
Number of Drivers (fall 1987)												
1	24.2	12.2	8.5	2.8	.4	Q	7.6	7.5	3.9	2.0	3.3	11.79
2	43.8	6.4	16.6	12.9	5.1	2.8	11.5	15.2	8.1	3.2	5.7	7.53
3	8.3	Q	1.4	2.6	2.0	1.9	1.6	2.8	1.4	1.1	1.4	14.29
4 or More	4.2	Q	Q	.8	1.1	1.8	.7	1.5	.9	.5	.6	20.44
Average Number of Vehicles per Household per year												
Part-Year Vehicle	3.9	3.1	Q	Q	NC	NC	2.4	Q	Q	Q	Q	31.39
Only 1	24.5	13.5	9.1	1.6	Q	Q	8.7	7.6	3.6	1.8	2.8	10.61
Between 1 and 2	9.1	1.1	4.7	2.3	.7	Q	2.0	2.9	1.8	.7	1.6	17.69
Only 2	24.3	1.7	10.1	8.9	2.5	1.2	5.8	9.2	4.3	2.1	2.9	10.23
Between 2 and 3	8.2	Q	1.7	3.6	2.0	.8	1.2	3.0	2.0	.7	1.3	15.54
Only 3	5.9	Q	.7	2.1	1.5	1.5	1.1	2.0	1.0	.6	1.1	19.13
Between 3 and 4	2.8	NC	Q	.4	1.0	1.2	Q	.8	.8	Q	.5	20.92
4 or More	2.7	NC	Q	Q	.6	1.7	Q	.8	.5	.4	.8	23.10

NC No cases in sample.

Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • Approximately 0.5 percent of the vehicle stock was owned by households that had no drivers as of fall 1987. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 22. U.S. Average Household Energy and Vehicle Expenditures, 1988
(Dollars per Household)

Household Characteristics	All Households		Households Without Vehicles		Households With Vehicles				RSE Row Factor
	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Number of Households (million)	Household Energy Expenditures (dollars)	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Household Energy Expenditures (dollars)	Vehicle Fuel Expenditures (dollars)	
RSE Column Factor:	1.154	0.595	2.944	1.254	1.304	0.587	0.583	0.884	
Household Characteristics									
Total	91.6	1,981	10.3	929	81.3	2,115	1,117	998	1.89
Energy Used in The Home--January 1987 through December 1987 (million Btu per household)									
50 or Less	17.9	1,326	2.4	451	15.6	1,459	624	835	5.59
51 to 75	16.0	1,743	1.4	689	14.6	1,846	890	956	5.26
76 to 100	16.3	1,823	2.1	868	14.2	1,962	1,039	923	5.03
101 to 125	14.9	2,056	2.0	1,108	13.0	2,199	1,196	1,003	4.41
126 to 150	9.8	2,347	1.0	1,304	8.8	2,461	1,330	1,131	4.93
151 or Over	16.7	2,789	1.6	1,496	15.1	2,922	1,727	1,195	3.67
Expenditures for Energy Used in The Home--January 1987 through December 1987 (dollars per household)									
600 or Less	14.0	1,000	2.7	401	11.3	1,145	439	706	5.53
601 to 800	15.2	1,420	2.0	710	13.2	1,529	703	827	4.14
801 to 1,000	14.9	1,729	1.5	891	13.5	1,819	905	914	4.70
1,001 to 1,200	14.6	1,953	1.5	1,108	13.1	2,050	1,099	952	3.76
1,201 to 1,600	19.1	2,424	1.7	1,375	17.4	2,525	1,383	1,143	2.98
1,601 or Over	13.8	3,293	.9	1,957	12.9	3,386	2,017	1,369	3.24
Measured Heated Area of Residence (square feet)									
Fewer than 600	7.9	1,221	2.5	628	5.5	1,488	720	769	7.99
600 to 999	24.0	1,489	4.1	846	19.9	1,622	818	803	4.17
1,000 to 1,599	25.5	1,969	2.2	1,056	23.3	2,056	1,071	984	3.98
1,600 to 1,999	11.8	2,221	1.0	1,463	10.8	2,292	1,217	1,074	5.25
2,000 to 2,399	9.0	2,487	Q	Q	8.8	2,509	1,355	1,153	5.46
2,400 to 2,999	8.1	2,605	Q	Q	7.8	2,641	1,453	1,189	4.84
3,000 or More	5.3	3,057	Q	Q	5.2	3,098	1,762	1,336	5.78
Main Heating Fuel									
Natural Gas	50.7	1,935	6.1	973	44.6	2,067	1,102	964	2.98
Electricity	18.2	1,970	1.4	772	16.8	2,073	1,079	994	5.58
Fuel Oil or Kerosene	12.3	2,081	2.2	938	10.1	2,334	1,348	986	5.01
Wood	4.9	2,125	Q	Q	4.7	2,178	916	1,262	9.11
Liquefied Petroleum Gas	4.2	2,223	Q	Q	4.0	2,303	1,181	1,122	10.51
Other/None	1.3	1,677	Q	Q	1.2	1,790	824	966	17.83
Census Region and Division									
Northeast	19.2	2,016	4.0	1,042	15.2	2,270	1,342	928	3.66
New England	4.4	1,999	.8	976	3.6	2,229	1,270	959	7.67
Middle Atlantic	14.8	2,021	3.2	1,059	11.6	2,282	1,364	919	4.32
Midwest	22.5	2,040	2.1	1,049	20.4	2,141	1,146	995	4.23
East North Central	16.1	2,021	1.8	1,086	14.3	2,135	1,158	977	5.54
West North Central	6.4	2,086	.3	859	6.1	2,156	1,117	1,039	6.92
South	31.2	2,039	2.9	852	28.3	2,160	1,133	1,027	3.47
South Atlantic	16.0	2,055	1.8	849	14.2	2,206	1,187	1,020	4.79
East South Central	5.9	1,947	.5	732	5.4	2,065	1,057	1,008	6.66
West South Central	9.3	2,071	.6	969	8.7	2,144	1,093	1,051	8.60
West	18.6	1,779	1.4	575	17.3	1,873	858	1,015	4.66
Mountain	4.5	1,945	Q	Q	4.3	2,015	957	1,058	9.33
Pacific	14.1	1,726	1.1	569	13.0	1,827	825	1,001	5.58

See footnote at end of table

Table 22. U.S. Average Household Energy and Vehicle Expenditures, 1988 (Continued)
(Dollars per Household)

Household Characteristics	All Households		Households Without Vehicles		Households With Vehicles				RSE Row Factor
	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Number of Households (million)	Household Energy Expenditures (dollars)	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Household Energy Expenditures (dollars)	Vehicle Fuel Expenditures (dollars)	
RSE Column Factor	1.154	0.595	2.944	1.254	1.304	0.597	0.597	0.594	
Census Region by 1987 Family Income									
Northeast									
Less than \$10,000	3.3	1,156	1.9	980	1.5	1,380	856	524	12.43
\$10,000 to \$14,999	2.5	1,500	.8	1,006	1.7	1,751	1,100	651	10.16
\$15,000 to \$19,999	1.7	1,681	Q	Q	1.5	1,784	1,215	569	14.31
\$20,000 to \$24,999	1.9	1,878	Q	Q	1.7	1,993	1,148	846	10.99
\$25,000 to \$34,999	3.7	2,006	.6	1,238	3.1	2,142	1,262	880	7.23
\$35,000 to \$49,999	2.9	2,611	Q	Q	2.9	2,656	1,485	1,171	8.09
\$50,000 to \$74,999	1.8	2,773	Q	Q	1.7	2,876	1,609	1,266	12.17
\$75,000 or More	1.3	3,471	Q	Q	1.3	3,571	2,153	1,418	10.72
Midwest									
Less than \$10,000	3.8	1,370	1.4	1,098	2.3	1,538	935	603	11.89
\$10,000 to \$14,999	3.5	1,671	Q	Q	3.4	1,691	982	710	11.22
\$15,000 to \$19,999	2.7	1,811	Q	Q	2.5	1,865	972	893	9.71
\$20,000 to \$24,999	2.3	2,140	Q	Q	2.2	2,241	1,193	1,048	10.97
\$25,000 to \$34,999	4.0	2,056	Q	Q	3.9	2,083	1,089	994	8.60
\$35,000 to \$49,999	3.5	2,609	Q	Q	3.4	2,663	1,339	1,323	6.32
\$50,000 to \$74,999	2.0	2,724	NC	NC	2.0	2,724	1,372	1,352	9.31
\$75,000 or More .....	.7	3,101	NC	NC	.7	3,101	1,829	1,272	18.81
South									
Less than \$10,000	6.4	1,331	2.0	852	4.4	1,555	899	656	9.92
\$10,000 to \$14,999	5.2	1,631	.5	753	4.8	1,717	917	800	10.47
\$15,000 to \$19,999	3.1	1,894	Q	Q	2.8	1,996	974	1,022	11.07
\$20,000 to \$24,999	3.2	2,075	Q	Q	3.2	2,089	1,089	1,000	10.35
\$25,000 to \$34,999	5.6	2,277	Q	Q	5.5	2,283	1,217	1,066	6.37
\$35,000 to \$49,999	3.9	2,713	NC	NC	3.9	2,713	1,373	1,340	7.28
\$50,000 to \$74,999	2.6	2,772	NC	NC	2.6	2,772	1,388	1,384	8.30
\$75,000 or More	1.2	3,026	NC	NC	1.2	3,026	1,621	1,405	19.39
West									
Less than \$10,000	2.9	1,166	.9	596	2.0	1,409	723	686	14.99
\$10,000 to \$14,999	2.1	1,397	Q	Q	2.0	1,471	731	740	13.76
\$15,000 to \$19,999	1.6	1,476	Q	Q	1.5	1,498	671	827	14.95
\$20,000 to \$24,999	1.7	1,587	Q	Q	1.6	1,631	733	898	15.68
\$25,000 to \$34,999	3.5	1,806	Q	Q	3.4	1,863	812	1,051	9.32
\$35,000 to \$49,999	2.9	2,114	Q	Q	2.8	2,113	945	1,168	9.43
\$50,000 to \$74,999	2.7	2,201	Q	Q	2.6	2,228	982	1,247	11.68
\$75,000 or More	1.3	2,676	Q	Q	1.3	2,735	1,315	1,420	11.78
Metropolitan Status									
Metropolitan	71.1	1,976	8.2	933	63.0	2,111	1,128	983	2.17
Central City	30.0	1,679	5.9	968	24.0	1,855	1,019	836	3.51
Outside Central City	41.2	2,193	2.2	840	39.0	2,270	1,196	1,074	2.98
Nonmetropolitan	20.5	1,999	2.2	912	18.3	2,128	1,078	1,050	4.00
Household Size									
1 Person	22.2	1,216	5.2	785	16.9	1,349	771	577	3.64
2 Persons	30.9	1,911	2.3	895	28.6	1,991	1,079	912	3.39
3 Persons	15.3	2,332	1.1	1,069	14.2	2,428	1,239	1,189	4.24
4 Persons	13.5	2,485	.9	1,250	12.6	2,571	1,326	1,245	4.76
5 or More Persons	9.7	2,697	.9	1,371	8.9	2,830	1,408	1,422	5.66

See footnote at end of table

Table 22. U.S. Average Household Energy and Vehicle Expenditures, 1988 (Continued)
(Dollars per Household)

Household Characteristics	All Households		Households Without Vehicles		Households With Vehicles				RSE Row Factor
	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Number of Households (million)	Household Energy Expenditures (dollars)	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Household Energy Expenditures (dollars)	Vehicle Fuel Expenditures (dollars)	
RSE Column Factor	1.154	0.593	2.844	1.254	1.304	0.597	0.593	0.834	
Household Composition									
Households with Children	32.9	2,354	2.9	1,175	29.9	2,469	1,272	1,198	3.25
Age of Oldest Child									
Under 7 Years	10.5	2,101	1.0	983	9.5	2,219	1,162	1,057	5.42
7 to 15 Years	16.0	2,346	1.3	1,190	14.7	2,449	1,276	1,173	4.38
16 or 17 Years	6.3	2,793	.6	1,450	5.7	2,940	1,444	1,497	6.96
Households without children	58.7	1,773	7.4	831	51.3	1,909	1,027	882	2.62
One Adult	22.2	1,216	5.2	785	16.9	1,349	771	577	3.84
Age of Householder									
Under 35 Years	5.5	1,352	.5	786	5.0	1,407	736	672	10.48
35 to 59 Years	6.2	1,342	.9	779	5.3	1,434	755	680	7.82
60 Years or More	10.5	1,072	3.8	786	6.7	1,236	810	426	6.00
Two or More Adults	36.6	2,111	2.2	942	34.4	2,185	1,153	1,032	3.38
Age of Householder									
Under 35 Years	8.7	1,851	.6	813	8.1	1,926	911	1,015	7.39
35 to 59 Years	13.5	2,486	.7	1,107	12.8	2,562	1,285	1,277	5.01
60 Years or More	14.4	1,914	.9	895	13.5	1,980	1,172	808	4.73
Origin of Householder									
White	78.1	2,028	6.6	887	71.5	2,134	1,124	1,011	2.17
Black	10.5	1,692	3.3	1,037	7.2	1,996	1,136	861	6.94
Other	3.0	1,770	Q	Q	2.6	1,916	888	1,029	13.92
Hispanic Descent									
Yes	4.8	2,013	.5	1,050	4.2	2,135	1,098	1,037	10.87
No	86.8	1,980	9.8	922	77.0	2,114	1,118	996	1.99
1987 Family Income									
Less than \$10,000	16.4	1,275	6.2	912	10.2	1,497	866	631	5.91
\$10,000 to \$14,999	13.4	1,580	1.6	871	11.8	1,673	930	743	5.82
\$15,000 to \$19,999	9.1	1,758	.8	992	8.3	1,829	961	868	6.65
\$20,000 to \$24,999	9.1	1,960	.5	831	8.6	2,022	1,060	962	6.94
\$25,000 to \$34,999	16.8	2,066	.8	1,053	16.0	2,117	1,108	1,009	4.26
\$35,000 to \$49,999	13.2	2,532	Q	Q	12.9	2,557	1,296	1,261	3.90
\$50,000 to \$74,999	9.0	2,593	Q	Q	8.8	2,619	1,305	1,314	5.18
\$75,000 or More	4.6	3,064	Q	Q	4.5	3,108	1,717	1,391	7.65
Below 100% of Poverty	10.6	1,404	4.0	972	6.6	1,664	929	736	7.22
Below 125% of Poverty	16.9	1,446	5.7	936	11.3	1,701	939	762	5.48
Number of Drivers (fall 1987)									
None	6.9	913	6.0	858	Q	Q	Q	Q	4.39
1	27.1	1,374	2.9	922	24.2	1,427	842	585	3.84
2	45.0	2,186	1.2	1,188	43.8	2,213	1,163	1,050	3.08
3	8.5	2,966	Q	Q	8.3	2,996	1,455	1,541	4.96
4 or More	4.2	3,463	Q	Q	4.2	3,492	1,607	1,885	6.10

See footnote at end of table

Table 22. U.S. Average Household Energy and Vehicle Expenditures, 1988 (Continued)
(Dollars per Household)

Household Characteristics	All Households		Households Without Vehicles		Households With Vehicles				RSE Row Factor
	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Number of Households (million)	Household Energy Expenditures (dollars)	Number of Households (million)	Household and Vehicle Energy Expenditures (dollars)	Household Energy Expenditures (dollars)	Vehicle Fuel Expenditures (dollars)	
RSE Column Factor	1.154	0.585	0.944	1.254	1.304	0.527	0.593	0.854	
Average Number of Vehicles per Household per year									
Part-Year Vehicle	3.9	1,278	NC	NC	3.9	1,278	969	309	17.89
Only 1	24.5	1,413	NC	NC	24.5	1,413	892	521	3.55
Between 1 and 2	9.1	1,978	NC	NC	9.1	1,978	1,055	922	5.90
Only 2	24.3	2,274	NC	NC	24.3	2,274	1,187	1,087	2.87
Between 2 and 3	8.2	2,644	NC	NC	8.2	2,644	1,287	1,356	4.36
Only 3	5.9	2,909	NC	NC	5.9	2,909	1,317	1,592	6.06
Between 3 and 4	2.8	3,525	NC	NC	2.8	3,525	1,502	2,023	6.47
4 or More	2.7	3,941	NC	NC	2.7	3,941	1,600	2,341	8.77

NC No cases in sample.

□ Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Table 23. U.S. Households by Changes in Vehicle Stock, 1988
(Million Households)

Household Characteristics	Households with no Change in Vehicle Stock during 1988				Households with Change in Vehicle Stock during 1988					RSE Row Factor
	All Households	Number of Vehicles			All Households	Type of Change				
		None	One	Two or More		Acquired Vehicle(s) Only	Disposed of Vehicle(s) Only	Aquired and Disposed of Exactly one Vehicle	Other Changes	
RSE Column Factor	0.455	1.366	0.836	0.764	0.860	1.614	1.126	1.222	1.617	
Household Characteristics										
Total	58.0	10.3	21.9	25.8	33.6	6.5	10.1	11.6	5.4	3.92
Census Region and Division										
Northeast	12.7	4.0	4.7	4.0	6.5	.9	2.2	2.5	1.0	7.38
New England	2.7	.8	.8	1.1	1.7	.3	.7	.5	.3	14.63
Middle Atlantic	10.0	3.2	3.9	2.9	4.8	.6	1.5	2.0	.7	9.36
Midwest	13.7	2.1	5.0	6.6	8.8	1.9	2.4	3.1	1.4	8.82
East North Central	9.7	1.8	3.4	4.5	6.4	1.1	2.0	2.2	1.1	10.51
West North Central	4.0	.3	1.6	2.1	2.4	.8	.4	.9	.3	18.66
South	19.2	2.9	7.7	8.7	12.0	2.6	3.1	3.9	2.3	7.10
South Atlantic	9.5	1.8	3.3	4.4	6.5	1.4	1.5	2.2	1.4	10.13
East South Central	3.9	.5	1.7	1.6	2.0	.5	.7	.5	.4	15.23
West South Central	5.8	.6	2.6	2.6	3.5	.8	1.0	1.2	.5	16.82
West	12.4	1.4	4.5	6.5	6.2	1.1	2.3	2.1	.8	7.97
Mountain	2.7	Q	1.0	1.4	1.8	.3	.7	.6	.3	18.52
Pacific	9.7	1.1	3.5	5.1	4.4	.8	1.6	1.5	.5	9.36
Metropolitan Status										
Metropolitan	45.1	8.2	17.1	19.9	26.0	5.0	8.1	8.9	4.1	4.44
Central City	20.5	5.9	8.4	6.2	9.4	1.7	3.5	2.9	1.3	7.43
Outside Central City	24.6	2.2	8.6	13.7	16.6	3.3	4.6	6.0	2.8	6.19
Nonmetropolitan	12.9	2.2	4.9	5.9	7.5	1.5	2.0	2.7	1.3	8.37
Household Size										
1 Person	17.8	5.2	11.0	1.6	4.4	1.1	1.3	1.8	Q	9.59
2 Persons	20.6	2.3	6.6	11.7	10.3	1.9	3.1	4.0	1.4	8.21
3 Persons	8.0	1.1	2.2	4.7	7.3	1.3	2.3	2.4	1.3	10.72
4 Persons	7.0	.9	1.4	4.7	6.5	1.4	1.6	2.1	1.4	10.92
5 or More Persons	4.6	.9	.8	3.0	5.1	.9	1.8	1.3	1.1	14.29
Household Composition										
Households with Children	17.6	2.9	4.7	9.9	15.3	3.3	4.0	5.1	2.9	6.96
Age of Oldest Child										
Under 7 Years	5.5	1.0	1.5	3.0	5.0	1.1	1.0	2.1	.8	12.46
7 to 15 Years	9.2	1.3	2.6	5.2	6.9	1.4	2.1	2.3	1.1	10.72
16 or 17 Years	2.9	.6	.6	1.7	3.4	.8	.9	.7	.9	17.73
Households without children	40.4	7.4	17.2	15.8	18.3	3.2	6.1	6.4	2.5	5.47
One Adult	17.8	5.2	11.0	1.6	4.4	1.1	1.3	1.8	Q	9.59
Age of Householder										
Under 35 Years	3.9	.5	3.0	.4	1.6	Q	.5	.7	Q	21.50
35 to 59 Years	4.7	.9	2.9	1.0	1.4	.4	Q	.5	Q	20.19
60 Years or More	9.2	3.8	5.1	Q	1.3	Q	.5	.5	Q	15.10
Two or More Adults	22.6	2.2	6.2	14.2	13.9	2.2	4.8	4.6	2.3	7.38
Age of Householder										
Under 35 Years	4.5	.6	1.2	2.7	4.2	.8	1.3	1.2	.8	15.01
35 to 59 Years	7.6	.7	1.3	5.6	6.0	.9	2.3	1.9	.9	11.57
60 Years or More	10.5	.9	3.7	6.0	3.8	.5	1.2	1.6	.6	12.74
Origin of Householder										
White	48.4	6.6	18.3	23.5	29.7	5.5	8.6	10.6	5.0	4.55
Black	7.7	3.3	3.0	1.4	2.8	.8	1.2	.5	Q	17.54
Other	1.9	Q	.7	.9	1.1	Q	.3	.5	Q	30.79
Hispanic Descent										
Yes	2.8	.5	1.2	1.2	1.9	.3	.6	.6	.4	21.00
No	55.2	9.8	20.8	24.6	31.6	6.2	9.5	11.0	5.0	4.04

See footnote at end of table

Table 23. U.S. Households by Changes in Vehicle Stock, 1988 (Continued)
(Million Households)

Household Characteristics	Households with no Change in Vehicle Stock during 1988				Households with Change in Vehicle Stock during 1988					RSE Percent
	All Households	Number of Vehicles			All Households	Type of Change				
		None	One	Two or More		Acquired Vehicle(s) Only	Disposed of Vehicle(s) Only	Acquired and Disposed of Exactly one Vehicle	Other Changes	
	1988	1987	1986	1985	1988	1987	1986	1985	1984	
1987 Family Income										
Less than \$10,000	13.1	6.2	5.5	1.4	3.2	0.9	1.0	1.1	Q	19.62
\$10,000 to \$14,999	9.2	1.6	4.8	2.8	4.2	1.0	1.5	1.4	0.4	12.75
\$15,000 to \$19,999	5.7	.8	2.9	2.0	3.4	.6	.9	1.3	.5	16.25
\$20,000 to \$24,999	5.7	.5	2.6	2.6	3.4	.5	1.0	1.3	.6	14.74
\$25,000 to \$34,999	9.5	.8	3.5	5.3	7.3	1.4	2.2	2.4	1.2	10.09
\$35,000 to \$49,999	7.2	Q	1.5	5.5	5.9	1.2	1.5	2.1	1.1	12.38
\$50,000 to \$74,999	4.7	Q	.6	3.9	4.3	.5	1.5	1.4	.8	15.73
\$75,000 or More	2.8	Q	.5	2.2	1.8	.3	.4	.6	.5	22.73
Below 100% of Poverty	8.0	4.0	2.8	1.1	2.7	.8	.9	.7	.3	16.38
Below 125% of Poverty	12.6	5.7	4.9	2.0	4.4	1.2	1.4	1.3	.5	12.55
Number of Drivers (fall 1987)										
None	6.4	6.0	Q	Q	.5	.4	Q	Q	NC	17.64
1	20.8	2.9	15.5	2.5	6.2	1.3	2.1	2.5	Q	9.26
2	25.8	1.2	5.8	18.8	19.1	3.7	4.8	7.5	3.2	6.57
3	3.6	Q	Q	3.1	4.9	.8	2.2	.9	1.0	13.05
4 or More	1.4	Q	Q	1.3	2.8	.4	.9	.6	1.0	17.48
Average Number of Vehicles per Household per year										
Part-Year Vehicle	NC	NC	NC	NC	3.9	.4	2.5	.7	.4	16.27
Only 1	21.9	NC	21.9	NC	2.5	NC	NC	2.5	NC	6.48
Between 1 and 2	NC	NC	NC	NC	9.1	2.6	4.0	1.1	1.4	8.60
Only 2	19.6	NC	NC	19.6	4.7	NC	NC	4.7	NC	7.16
Between 2 and 3	NC	NC	NC	NC	8.2	2.4	2.7	1.0	2.1	7.94
Only 3	4.9	NC	NC	4.9	1.0	NC	NC	1.0	NC	16.17
Between 3 and 4	NC	NC	NC	NC	2.8	.6	.9	.2	1.0	15.59
4 or More	1.2	NC	NC	1.2	1.4	.5	Q	.4	.5	19.85

NC No cases in sample.

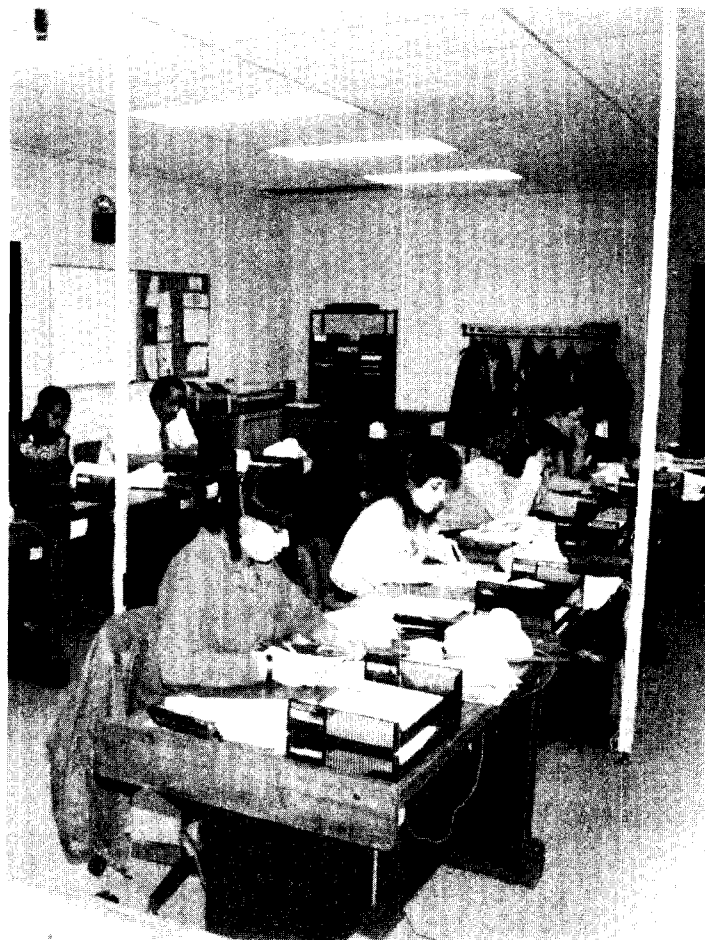
Q Data withheld because the RSE was greater than 50 percent or fewer than 10 households were sampled.

Notes: • Households with Children include members under age 18 years old unless the member is the householder or spouse. • To obtain a Relative Standard Error (RSE) percent for any table cell, multiply the cell's corresponding column and row factors. • Because of rounding, data may not sum to totals. • Data in this table are for households with vehicles for personal transportation. • See "Glossary" for definition of terms used in this report.

Source: Energy Information Administration, Office of Energy Markets and End Use, Forms EIA-876 A, B, C, of the 1988 Residential Transportation Energy Consumption Survey and Form EIA-457 B of the 1987 Residential Energy Consumption Survey. (for specific titles of forms, see Appendix D.)

Appendix A

How The Survey Was Conducted



*Telephone interview versus personal
interview was used to collect the
data in the RTECS.*

Appendix A

How The Survey Was Conducted

Introduction

The Residential Transportation Energy Consumption Survey (RTECS) was designed by the Energy Information Administration (EIA) to provide data about the motor vehicle stock, the vehicle miles traveled (VMT) and the vehicle fuel consumption and expenditures for vehicles that are used for personal transportation in the United States. The RTECS is a companion survey to the Residential Energy Consumption Survey (RECS). The RECS collects household energy consumption and expenditure data.

The RTECS collects vehicle information through a telephone interview with a representative national sample of households. Copies of the data collection forms are reproduced in Appendix D, "Survey Forms." The 1988 RTECS is the third such survey covering a calendar year conducted by EIA; previous surveys were collected in 1983 and 1985. Prior to the 1983 RTECS, monthly surveys were conducted from June 1979 to September 1981. Subsequent surveys will be conducted triennially, with the next one scheduled in 1991.

This appendix provides detailed information concerning: (1) the RTECS survey design, including a comparison between the 1985 and the 1988 RTECS designs; (2) the sample design; (3) the data collection procedures; (4) the Vehicle Identification Number (VIN); (5) interviewer training; (6) efforts undertaken to minimize the nonresponse biases; (7) survey estimate weights; (8) data editing procedures; (9) data preparation procedures; and (10) data confidentiality and the preparation of the public use data tape.

Changes in Survey Design and Data Collection

The 1988 RTECS marked a major change in the survey design and the data collection procedures

made, in large part, due to budget constraints. The major change focused on the way the fuel efficiencies were estimated. Previous RTECS collected data used in calculating fuel efficiencies through monthly fuel purchase diaries maintained by respondents. The 1988 RTECS calculated fuel efficiencies using the Environmental Protection Agency (EPA) laboratory-test miles per gallon (MPG) adjusted for on-road fuel efficiency shortfall. (See Appendix B, "Estimation Methodologies" for further discussion.) It is not anticipated that the change in methodology will result in increased error; although the errors will come from different sources than in previous RTECS. Therefore, any comparison of vehicle fuel efficiency, consumption and expenditures with previous RTECS must be viewed with caution. Changes in the 1988 RTECS design and data collection included the following:

- The sample size of the 1988 RTECS was smaller compared to the 1985 RTECS (1985: 4,020 households, and 1988: 2,986).
- Respondents in the 1988 RTECS, unlike previous RTECS, were not required to maintain monthly fuel purchase diaries.
- The number of contacts with respondents required to collect the data in 1988 was substantially reduced. In 1988, four contacts were made to the household compared to approximately 10 in the 1985 RTECS.
- In 1988, MPG and fuel price data were estimated by different means than were used in 1985. In 1988, MPG were estimated using adjusted test laboratory MPG as recorded on the EPA Emissions Certification files. Fuel price data were obtained from the Bureau of Labor Statistics (BLS) gasoline pump price series and the Lundberg Survey, Inc., price series. (See Appendix B, "Estimation Methodologies" for a detailed discussion of the estimation procedures used in this report.)

- For the first time in 1988, respondents were asked to provide the Vehicle Identification Number (VIN) for each vehicle. The decoded VIN was used to enhance the accuracy of reported vehicle characteristics. These characteristics were used to match sampled vehicles to the EPA Certification files. (See "The Vehicle Identification Number" section in this appendix for a detailed discussion of the VIN).

- Households in the 1988 RTECS did not receive a monetary incentive to participate, as they did in the 1985 RTECS.

Table A1 provides a more complete comparison of the major differences between the 1988 RTECS and the 1985 RTECS. Several of these changes are also discussed in greater detail in the appropriate sections of this report.



Type of fuel used was collected in the RTECS. This is a full/self-service station where different types of fuel can be purchased.

Table A1. Comparison of the 1985 and 1988 Residential Transportation Energy Consumption Survey

Survey Sample and Design	1985	1988
Sample Size	4,020 households	2,986 households
Number of Contacts Prior to Each Data Collection Phase	Two mailings, one telephone	One mailing
Data Collection Instruments	RECS questionnaire, Odometer Reading Cards, monthly fuel purchase diaries, telephone questionnaires	RECS questionnaire, Odometer Reading Cards, Vehicle Identification Cards, telephone questionnaires
Contacts of Households Without Vehicles	Different data collection instruments	Same data collection instruments
Contacts of Households Unreachable by Telephone	Personal interview	Paid return envelopes, different instructions, vehicle characteristics not collected
Respondents Monetary Incentive	One dollar for Beginning-of-Year (B-O-Y) and End-of-Year (E-O-Y) odometer readings. Five dollars for each completed monthly vehicle diary	None

Table A1. Comparison of the 1985 and 1988 Residential Transportation Energy Consumption Survey (Continued)

Vehicle Characteristics	1985	1988
VIN	Not collected	Collected
Transmission Type	Collected	Collected
Number of Cylinders	Collected	Collected
Drive Type	Not collected	Collected
Fuel System Type	Not collected	Collected
Engine Size	Not collected	Collected
Air Conditioning	Collected	Not collected
Number of Doors	Collected	Not collected
Fuel Types and Grade	Intermediate grade category not collected; regular leaded or premium leaded gasoline collected.	Intermediate grade category collected; did not distinguish between regular or premium leaded gasoline.
Truck Tonnage	Collected	Not collected (alternative model name)
Type of Primary Service (full-, self-, or mini-service)	Not collected	Collected
Number of Drivers vehicle during RTECS	Collected for each for households	Collected only during RECS
Use Vehicle for Work	Collected	Collected

Table A1. Comparison of the 1985 and 1988 Residential Transportation Energy Consumption Survey (Continued)

Consumption and Expenditures	1985	1988
Vehicle Miles Traveled (VMT)	Collected from several odometer readings cover- ing full year (B-O-Y, E-O-Y, M-Y and/or log opportunities) no odom- eter reading collected at RECS	Fewer contacts to obtain odom- eter readings. Emphasis was on B-O-Y and E-O-Y data collection. RECS was used to obtain additional odometer readings.
Miles per Gallon (MPG)	Estimated from monthly fuel purchase diaries	Obtained from EPA Certifi- cation files and adjusted for on-road driving
Vehicle Fuel Consumption	Derived from annual VMT and MPG.	Same as 1985
Fuel Price	Obtained from single monthly fuel purchase diary and annualized using BLS gasoline pump price series	Obtained from BLS gasoline pump price series and Lundberg Survey, Inc. price series.
Vehicle Fuel Expenditures	Derived from consumption and price data	Same as 1985
Type of Fuel	Obtained from single monthly fuel purchase diary	Obtained from RTECS question- naire

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Sample Design

The sample design for the 1988 RTECS consisted of a core (self-weighting) national sample of households plus an oversample of high-mileage households. (See "Glossary" for definition of High-Mileage Households.) Oversampling high-mileage households allowed the RTECS to: (1) collect data on more vehicles, and (2) provide better estimates for major statistics such as VMT and vehicle stock.

The target population for the RTECS as of July 1988, was estimated at 91.6 million households based on adjusted estimates of households from the U.S. Bureau of the Census, Current Population Survey (CPS). The universe for the RTECS is comprised of all housing units occupied as the primary residence in the 50 States and the District of Columbia. (See "Glossary" for a definition of Housing Unit.) The sample of households selected for the 1988 RTECS was based on the 1987 RECS multistage area probability sample. The RECS incorporates a rotating panel that allows the observation of changes in energy use over time when the same households are in two successive surveys. The RECS also oversamples low-income households in order to meet the needs of the Family Support Administration (FSA). The original RECS sample consisted of 8,232 housing units. Of these, 1,049 units were considered ineligible either because of current vacancies, seasonal occupancy, or they were not habitable. Of the 7,183 eligible units, energy-related information was collected from 6,229 households, for an 86.7 percent response rate for the RECS. (See *Housing Characteristics 1987* (Published May 1989), DOE/EIA-0314(87), GPO Stock No. 061-003-00619-1 for a detailed discussion of the RECS Sample Design.)

The RTECS sample consisted of 2,986 housing units selected from the 6,229 available 1987 RECS housing units for which data were successfully collected.

The fraction of RECS housing units selected for RTECS was 47.9 percent. At the beginning of the data collection period in January 1988, 2,783 (93.2 percent) of the 2,986 housing units were identified as housing units that could potentially be contacted by telephone and 203 housing units (6.8 percent) were identified as households that could not be contacted by telephone, either because they did not have telephones, they had unlisted numbers, or they had refused to provide a telephone number during the

RECS interview. This group was classified as mail households and data were collected from these households via a mailed questionnaire rather than a telephone interview. By the end of the RTECS survey cycle (February 1989), the percent of households considered mail households had increased to 477 or 16 percent because of an increased number of households with unlisted numbers or disconnected telephones.

The 1988 RTECS sample was selected in three groups. This was necessary because the Beginning-of-Year (B-O-Y) RTECS contacts were scheduled to begin in early January 1988, before the completion of the 1987 RECS interviews. The first RTECS sample group was selected from the RECS households that had completed RECS interviews as of November 30, 1987. The RTECS interviews for this group began in early January 1988. The second RTECS sample group was selected from the RECS households that had completed RECS interviews as of January 31, 1988. The RTECS interviews for this group began in March 1988. The last RTECS sample group consisted of 90 households and was selected from the RECS households that completed interviews during February 1988. No B-O-Y data were collected for these 90 households. Instead, data for these households were collected during the Mid-Year (M-Y) and E-O-Y interviews.

Data Collection

The RTECS was divided into four data collection phases. The first phase occurred as part of the RECS personal interview. During this interview, the household's vehicle stock was enumerated, and if possible, the VIN and the odometer reading for each vehicle were recorded. Household characteristics were also collected. The vehicle inventory collected at this time provided a baseline for the remaining three data collection phases. Phases two through four, B-O-Y data collection, M-Y data collection and E-O-Y data collection, respectively, were conducted via telephone interviews. For households that could not be contacted by telephone, the data were collected via a mail questionnaire.

B-O-Y and E-O-Y Data Collection Phase: Data collected during the B-O-Y and E-O-Y phases consisted of an update of the vehicle stock and for each vehicle recorded: the vehicle characteristics such as the make, model and model year, engine size,

fuel system type, and transmission type; vehicle fuel characteristics such as the fuel type, fuel grade and type of pump service; odometer readings; and VIN. See below for description of M-Y data collection.

One week prior to each B-O-Y, M-Y, and E-O-Y data collections, a mailing was sent to the RTECS respondents. The B-O-Y and the E-O-Y mailings consisted of the following: (1) Odometer Reading Cards; (2) VIN cards; (3) a page of instructions; (4) a letter from the Director of the Office of Energy Markets and End Use of the EIA explaining the survey; and (5) a letter from the survey contractor explaining their role in the survey. (See "Data Collection Instruments" listed below in this appendix.) Additionally, a brochure, displaying results from the 1985 RTECS was prepared by the EIA and included in the B-O-Y mailing. A different brochure prepared by the Department of Energy (DOE) titled *Tips for Energy Savers* was included in the E-O-Y mailing along with a vehicle-shaped magnet.

M-Y Data Collection Phase: The M-Y mailing consisted of a letter from the Director of the Office of Energy Markets and End Use and a vehicle update worksheet for the respondents to complete. At this time, no vehicle characteristic data were obtained; only an inventory update was collected. The respondent was instructed to either keep the worksheet by the telephone for the telephone interview or return the worksheet by mail, if the household was classified as a no-telephone household. A vehicle-shaped magnet was included in the mailing to the no-telephone households. Any respondent who had refused at the B-O-Y interview was not contacted during the M-Y data collection phase. These households were not contacted at the M-Y interview, in order to increase the probability that the household would respond to the E-O-Y data collection. During the telephone interview, data were collected using the RTECS questionnaires. Figure A1 provides a list of data collection items associated with each data collection phase.

Data Collection Dates

The initial enumeration of vehicle stock and the characteristics of the households were collected in the fall of 1987. The B-O-Y data collection occurred January 1988 through early March 1988. The M-Y update occurred in May and June 1988 and the E-O-Y data collection took place during January and February 1989.

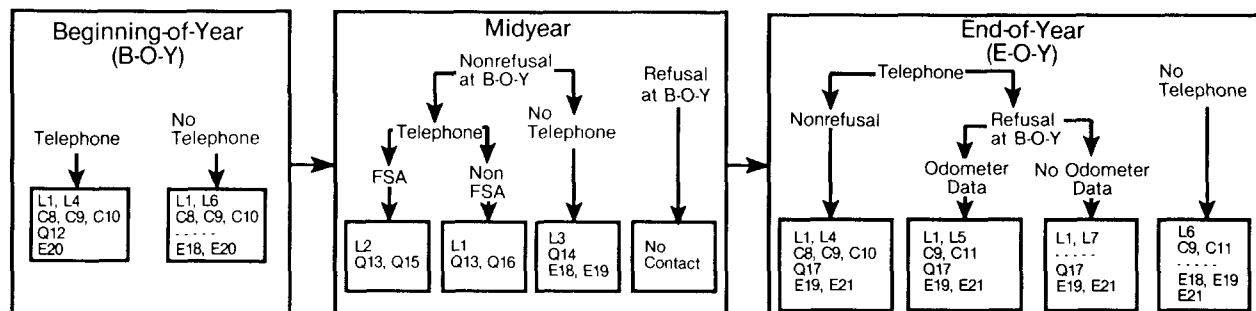
Data Collection Instruments

The data collection instruments for the RTECS consisted of four types: (1) the 1987 RECS questionnaire; (2) Odometer Reading Cards; (3) Vehicle Identification Number Cards; and (4) RTECS questionnaires. (See Appendix D "Survey Forms" for examples of these data collection instruments.)

1987 Residential Energy Consumption Survey Questionnaire (Form EIA-457B)--This form was used during the RECS personal interview. Questions on this form included the number of vehicles in the household, and for each vehicle: the VIN; the vehicle type; the vehicle make, model, and model year; the odometer reading; and estimated miles traveled during the past year or since the vehicle was acquired, if the vehicle was acquired within the previous 12 months. Household characteristics questions included the number of household members, and for each household member: their age, gender, employment status, and relationship to the head of household. The education level and ethnic background were collected for the head of the household only. The number of drivers, annual family income and income assistance were collected for the household.

Odometer Reading Card (Form EIA-876A,C)--This form was mailed to the respondent prior to the B-O-Y and E-O-Y data collections and was used as a reference by the respondent during the telephone interview. The card was used to record, on an assigned date, the odometer readings for each reported vehicle during both the B-O-Y and E-O-Y data collections. A computer-generated label attached to the card identified each vehicle by make, model, and year of the vehicle. The respondents were instructed to enter the vehicle's odometer reading on the card after the last use of the vehicle on the specified assigned date. For the B-O-Y data collection, respondents were assigned one of the following dates, January 4, January 8, January 12, or February 29, 1988. For the E-O-Y data collection, they were assigned either January 4, January 12, January 19, or January 26, 1989. No odometer reading cards were provided during the M-Y data collection. An additional odometer reading card without a computer-generated label was included for the respondent to record odometer readings for any vehicle acquired since the last contact.

Figure A1. Data Collection Instruments by Data Collection Phase



FSA = Family Support Administration

Letters

- L1 = DOE contact letter
- L2 = DOE contact letter to FSA households
- L3 = DOE contact letter to no-telephone households
- L4 = Contractor contact letter to telephone households explains VIN and odometer cards
- L5 = Contractor contact letter to telephone households explains only odometer cards
- L6 = Contractor letter to no-telephone households
- L7 = Contractor letter to telephone households does not mention VIN or odometer cards

Cards and Instructions

- C8 = Vehicle Identification Card (VIN)
- C9 = Odometer Reading Card
- C10 = Instruction Sheet for VIN and Odometer Reading Cards
- C11 = Instruction Sheet for only Odometer Reading Cards

Questionnaire

- Q12 = Beginning-of-Year telephone questionnaire
- Q13 = Midyear Vehicle Update Worksheet
- Q14 = Midyear Vehicle Update Form
- Q15 = Midyear telephone questionnaire with FSA questions
- Q16 = Midyear telephone questionnaire without FSA questions
- Q17 = End-of-Year telephone questionnaire

Other Enclosures

- E18 = Stamped return envelope
- E19 = Vehicle-shaped magnet
- E20 = EIA produced brochure
- E21 = DOE produced brochure

Notes: • All households at B-O-Y data collection phases received a blank VIN card • All households at E-O-Y data collection received a blank VIN card unless they had previously refused to provide a VIN. • Households did not receive a specific VIN card for any vehicle that had a previously collected good VIN • Midyear Vehicle Update Form and Midyear Vehicle Update Worksheet contain identical questions. The titles were different to distinguish between no-telephone households and telephone households. • See *Housing Characteristics 1987* (Published May 1989) DOE/EIA0314 (87), for information pertaining to the data collected for the Family Support Administration.

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

VIN Card (Form EIA-876)--This form was mailed to the respondent and used as a reference during the telephone interview. The card was used to record the VIN for each reported vehicle. Each VIN card had a computer-generated label identifying the specific vehicle assigned to the card. A thorough explanation of the VIN and where to locate it was provided on the card. A blank VIN card was also provided to record the VIN for any vehicle acquired since the last contact. For the B-O-Y data collection, the VIN cards were mailed only if the VIN was not obtained during the RECS interview or if the VIN had been transcribed incorrectly. For the E-O-Y data collection, the VIN was collected only from households that had acquired a new vehicle at the M-Y data collection phase. Households were not mailed a VIN card if they had refused to provide a VIN during any previous RTECS contact, at the time of the RECS contact, or if they were previously classified as a nonrespondent household.

The odometer and VIN cards were mailed to the respondents approximately 1 week prior to the telephone interview. The respondents were requested to keep both the odometer and VIN cards by their telephones so they would be readily available when the interviewer telephoned. If the household was classified as a no-telephone household, the respondent was requested to return the cards in a self-stamped, business reply envelope that was provided.

Residential Transportation Energy Consumption Survey Questionnaire (Form EIA-876A-C)--This form was used by the telephone interviewer to record information gathered during the telephone interviews. Vehicle data obtained with this questionnaire included: verification of the stock of vehicles; motor vehicle characteristics for each vehicle, such as transmission type, drive type, fuel system type, engine size, and number of cylinders; vehicle fuel characteristics such as fuel type, fuel grade and type of pump service; odometer readings; and VIN. The questionnaire consisted of three types: the B-O-Y telephone questionnaire (Form EIA-876A), the M-Y mail and telephone questionnaire (Form EIA-876B), and the E-O-Y telephone questionnaire (Form EIA-876C).

The B-O-Y and E-O-Y telephone questionnaires were used only by the telephone interviewers to record respondents answers during the telephone interview. These questionnaires were divided into

discrete sections that were color-coded to help the interviewer in determining the correct skip patterns.

B-O-Y Questionnaire: The discrete sections for the B-O-Y Questionnaire consisted of:

1. A call record sheet and protocol.
2. Questions pertaining to vehicle characteristics for only vehicles that were recorded during the RECS interview. A computer-generated fold-out page was included that listed the make, model and year of all vehicles obtained during the RECS interview. The status of the VIN was also included (whether it was obtained, or whether it was transcribed correctly).
3. Questions pertaining to vehicles that were disposed of since the RECS interview.
4. Questions pertaining to vehicles acquired since the RECS interview or any vehicles not recorded during the RECS interview.
5. Questions pertaining to the households intention to move within 12 months.

M-Y Questionnaire: The M-Y Questionnaire that was mailed to the respondents requested only minimal vehicle update information on the acquisition and disposition of vehicles since the B-O-Y data collection. Respondents with telephones were requested to complete the form and to keep it by the telephone in preparation for the telephone interview. The respondents without telephones were requested to complete and return the form to the survey contractor. The M-Y questionnaire used by the telephone interviewers to record the respondents answers contained:

1. A call record sheet and protocol.
2. Computer-generated pages showing the most recent vehicle inventory for the household.
3. Questions relating to the vehicles disposed of since the RECS interviewer or the B-O-Y interview.
4. Questions relating to the vehicles acquired since the RECS interview or the B-O-Y interview.

5. Questions pertaining to the households intention to move within the following six months.

Note: For a selected number of households, additional questions pertaining to government assistance to low-income households and interruptions in home heating were asked at the end of the RTECS interviews. These data, collected as part of the Family Support Administration (FSA) update to RECS, were completely independent from the RTECS questions. The FSA questions were collected during the RTECS data collection as a cost-saving measure and as a method of reducing the respondent burden by combining the two telephone contacts into one telephone call.

E-O-Y Questionnaire: Two types of questionnaires were used for the E-O-Y data collection, depending on the responses at the M-Y interview. For households that had indicated at the M-Y update that they had acquired or disposed of a vehicle, the questionnaire contained two additional sections. The first new section pertained to acquired vehicles and contained questions about the vehicle characteristics, the VIN, and the odometer reading. The second section pertained to disposed vehicles. An additional computer printout was included listing the new vehicles obtained at the M-Y. For households that did not indicate at the M-Y update that they had acquired or disposed of a vehicle, the questionnaire was similar to the B-O-Y questionnaire, including questions pertaining to vehicle acquisitions and disposals since the last contact. Questions relating to the households intention to move were eliminated.

Vehicle Identification Number

In the 1988 RTECS, the VIN was collected for the first time. The VIN is a unique identification number assigned to a vehicle by the automobile manufacturers for the purpose of identification.

Beginning with the 1981 vehicle model year, the U.S. Department of Transportation (DOT) has required that a standard identification format consisting of 17 characters be attached to all over-the-road vehicles sold in the United States. Between 1954 and the 1981 DOT standard, automobile manufactures in the United States had included an 11 to 15 digit VIN on all vehicles.

In the 1988 RTECS, the MPG were estimated using EPA laboratory test results of MPG (See Appendix B, "Estimation Methodologies", for a complete discussion of the consumption and expenditure estimation procedures used in the 1988 RTECS.) To assign a test MPG to a particular vehicle, the specific characteristics of the vehicle were required. In the 1988 RTECS, these vehicle characteristics were obtained from two sources: (1) the decoded VIN's, and (2) the RTECS questions about vehicle characteristics that the respondent answered. The 1988 RTECS also provided a unique opportunity to assess the reliability of the respondents answers by comparing their responses to the RTECS vehicle characteristic questions with an independent source of data containing the vehicle characteristics for the same vehicles, that is, the VIN.

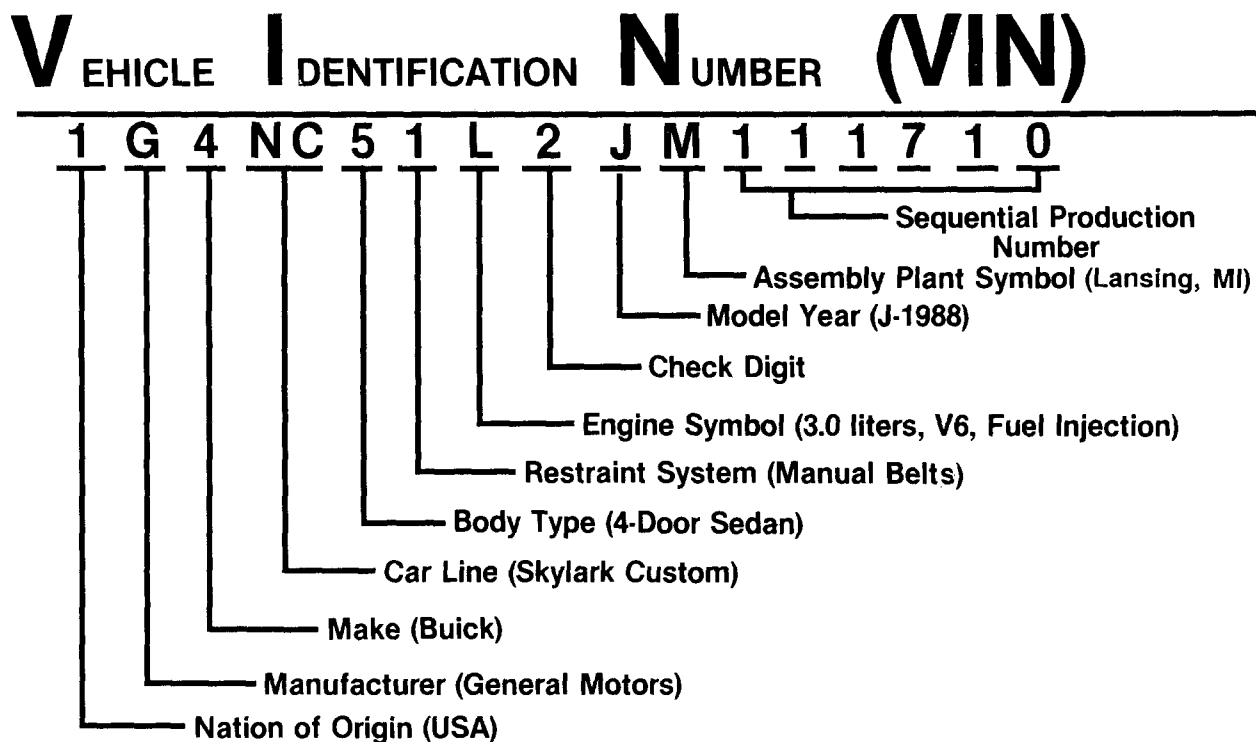
The Decoded VIN

The VIN is a sequence of numbers and letters, that when decoded, provides vehicle characteristics that range from nation of origin to the individual assembly plant where the vehicle was manufactured. The first three characters of the standard VIN format, designated as the World Manufactures Identification (WMI), identify the nation of origin, the manufacturer, and the vehicle make. The next five characters are the Vehicle Description Section (VDS). These characters identify the vehicle model; the body type such a sedan or station wagon; the engine type; which includes characteristics like the number of cylinders, cubic inch displacement and net brake horsepower; the restraint system found in the vehicle; and a model change code. There is no fixed format or standard codes within this five character field. The ninth field contains a check digit. The check digit is an internally consistent number computed from the other identification numbers according to a mathematical formula. It is used during the decoding process to verify the accuracy of the other identification numbers. The next section is the Vehicle Identification Section (VIS) and contains eight characters. The first character in this section is the vehicle model year, the second character is the assembly plant name and/or location. The last six letters in this final section represent the sequential production number for a specific vehicle. To protect the confidentiality of the respondents, the sequential production number for a specific vehicle was not included on the RTECS public use tape.

Figure A2 provides an example of a VIN and the type of data that can be obtained from decoding the VIN. (Detailed information about the VIN can be

obtained from the annual editions of the *Passenger Vehicle Identification Manuals* published by the National Automobile Theft Bureau.)

Figure A2. Example of a Decoded Vehicle Identification Number



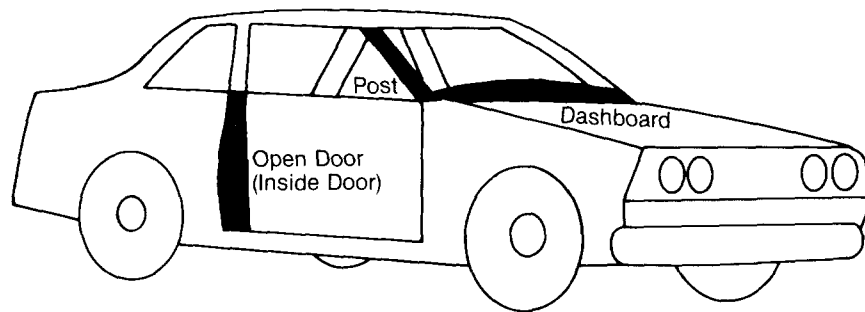
Source: National Automobile Theft Bureau, Inc., *1988 Passenger Vehicle Identification Manual* (published 1988), pp. 68-71.

Location of the VIN

Generally, in most passenger cars the VIN is attached to the left side of the dash or instrument panel and is visible through the outside of the windshield. In some instances, the VIN is located on the inside of the door panel on the driver's side. Imported

automobiles often attach the VIN to the windshield pillar post or on top of the steering column (Figure A3). Also, the VIN can be inscribed on the following documents: insurance cards, vehicle registrations, vehicle titles, safety or emission certificates, insurance policies and bills' of sale.

Figure A3. Location of the Vehicle Identification Number



Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Collecting the VIN

The 1988 RTECS was the first RTECS that asked respondents to provide the VIN for each vehicle. Since there were only limited examples of how either the respondents or the interviewers would react to attempts to collect the VIN, it was unknown whether the interviewers would be reluctant to ask for the VIN, whether the interviewers or respondents would be able to locate the VIN on the vehicle, or if once located, the VIN would be transcribed accurately. It was also unknown whether the respondents would readily provide the information or if they would instead consider the data sensitive. A pretest of the VIN question was conducted in the spring 1987. Results of the pretest suggested a slightly lower response rate on the VIN question than actually occurred during the RTECS. Also pretest estimates of the percent of VIN collected and the percent validated were close to the actual RTECS estimates. (See Appendix C, "Quality of the Data" for a discussion of the response rates for the VIN.)

The following steps were taken to allay respondent or interviewer concerns that might contribute to a low response rate on this question.

1. The initial collection of the VIN occurred during the RECS. Since the RECS data are collected in personal interviews, this survey would allow the interviewer to actually record the VIN from either the vehicle or a document.
2. The survey design allowed for the collection of the VIN during several different stages of the RTECS, thus eliminating the need to rely on a one-time effort. The VIN could be obtained during the RECS interview, the RTECS B-O-Y interview or during the E-O-Y interview. Only the RTECS households that did not provide a VIN at the time of the RECS interview or if the VIN was incorrectly transcribed during the RECS, were asked to provide the VIN again during the RTECS B-O-Y data collection. Additionally, no VIN data were asked at the M-Y data collection and, furthermore, a household that had refused to provide a VIN at any time was not asked for the VIN a second time.
3. The importance of obtaining an accurate VIN for a successful RTECS was emphasized during both the RECS and RTECS interviewer training sessions. Considerable interviewer training time was allocated to describing the VIN and providing the interviewers with thorough directions for locating and recording the VIN.
4. The RECS interviewers were provided with examples of the VIN and with a timely article encouraging vehicle owners to inscribe the VIN on their vehicle windows as a method of providing vehicle identification in the event of theft. (*American Automobile Association World Magazine*, September/October 1987, pp. 30-31).
5. RTECS pre-collection mailings to the households contained an explanation of the VIN and how to locate and record it.

The Interview

The primary method of data collection for the 1988 RTECS was a telephone interview. (For the 6.8 percent of the RTECS households that could not be contacted by telephone, the VIN Cards, Odometer Reading Cards, and a postage-paid return envelope were mailed along with instructions directing the respondents to return the cards in the envelopes.) The average B-O-Y telephone interview lasted 7.6 minutes. The M-Y interview lasted between 3 to 4 minutes, depending on whether the respondent was asked the FSA update questions. Most respondents had recorded the odometer readings and VIN for each vehicle on the cards they received prior to the telephone calls.

The initial vehicle data were collected in the RECS personal interview. This interview lasted an average of 56 minutes. However, motor vehicle data were only one type of energy data collected at this time and were a small part of the respondent burden. Information about the structural features of the housing unit, the heating and cooling systems, energy fuel used, and conservation improvements were among the non-vehicle type of energy data collected.

Interviewers and Interview Training

A total of 76 interviewers completed one or more telephone interviews. Of these interviewers, five interviewers had worked on the 1985 RTECS. All interviewers attended 3-hour training sessions held just prior to the B-O-Y and E-O-Y data collection and a 90-minute training session prior to the M-Y

data collection. Interviewer trainers were staff members from the survey contractor who were familiar with the RTECS. The B-O-Y and E-O-Y training sessions were observed by the EIA RTECS Survey Manager.

All interviewers were provided with a booklet of instructions. The first half of the training sessions consisted of general instructions pertaining to the RTECS forms, with a thorough explanation of the VIN and a discussion of possible trouble areas. During the second half of the training session, the interviewers were divided into three small groups. Three mock interviews were completed in each of these groups.

Immediately following each training session, the interviewers began contacting respondents. All telephone interviews were initially monitored by contractor supervisory personnel who were then able to provide instant feedback to the interviewer. Subsequent periodic monitoring occurred during each data collection phase.

Because particular emphasis was placed on maintaining or improving B-O-Y response rate, special refusal conversion measures were undertaken for the E-O-Y collection. For example, the most experienced interviewers were used; all E-O-Y interviewers were required to have worked on the B-O-Y data collection. Interviewers made an extraordinary effort and succeeded in converting approximately 265 households that were formerly classified as refusals at the B-O-Y or M-Y interviews to respondents at the E-O-Y interview.

Minimizing Nonresponse Bias

Nonresponse bias is one type of nonsampling error that contributes to the total error of a survey. Other nonsampling errors include population undercoverage during sampling, interviewer error, coding and/or key punching errors, and response bias. The wording and format of the survey questionnaires, the procedures used to select and train interviewers, and the quality control procedures built into the data collection and processing operations were all designed to minimize these sources of error (See Appendix C, "Quality of the Data" for a discussion of nonsampling errors other than nonresponse bias.)

It was recognized in the early planning stages of the 1988 RTECS that special attention would have to be given to minimizing nonresponse bias, since the

RTECS households were contacted several times a year, in addition to the initial RECS personal interview. The following steps were taken to minimize the nonresponse: (1) If possible, the VIN was collected during the RECS interview, thus, reducing the need to ask for the VIN during the RTECS, if it was successfully collected during the RECS; (2) The M-Y data collection instrument was streamlined with the primary emphasis placed on updating the vehicle stock and obtaining the odometer readings for any disposed of or acquired vehicle. The vehicle characteristics and VIN for newly acquired vehicles were collected during the E-O-Y data collection instead of during the M-Y update; (3) No M-Y data collection was attempted for households declared as legitimate refusals at the B-O-Y interview. All households were recontacted for the E-O-Y data collection, however, only households that previously had a valid odometer reading were asked to provide the E-O-Y odometer reading. None of the households that previously refused were asked any VIN questions; (4) A letter describing the survey and its importance was mailed to the households approximately one week prior to the B-O-Y and E-O-Y telephone interviews; (5) Only experienced interviewers that had worked on the B-O-Y interview worked on the E-O-Y data collection; (6) Non-monetary incentives were used. A brochure highlighting some of the results from the 1985 RTECS was mailed to all B-O-Y households. A vehicle-shaped magnet was included in the M-Y mailing to the no-telephone households, and in the E-O-Y mailing to all households. A brochure about energy conservation, published by the DOE was included in the E-O-Y data collection; and (7) The interviewers were requested to attempt up to eight telephone calls before the household was classified as a non-contact and in many cases made up to 16 or more attempts to contact the household. (See *Housing Characteristics 1987*, DOE/EIA-0314(87), for a detailed discussion of the efforts to minimize non-response bias in the RECS.)

Approximately 77 percent of the households responded to at least one of the RTECS data collection phases, however, because the RTECS sample was selected from RECS respondents, in no cases were data for a respondent totally absent.

Imputations

In the instances when a RECS respondent refused to participate in one or more of the RTECS data collection phases, a decision was made to impute the

the missing data rather than re-adjust the weights to account for the RTECS nonresponse because of the availability of RECS data for these households. Missing data items were imputed using the following: RECS data files on vehicle characteristics; decoded VIN; hot and cold-deck procedures; linear and logistic regression; predictive mean matching; and EPA data files. (See Appendix C, "Quality of the Data" for a discussion of the imputation procedures used.)

Survey Estimate Weights

All the statistics published in this report are estimates of population values, such as the total number of households in the United States. These estimates are based on a subset of the entire population of households chosen according to multistage probability sample selection rules. The universe includes all households in the 50 States and the District of Columbia, including households on military installations. Survey estimates inflate the RTECS sample results to represent the target population. This required the development of weights for each sample household using a multistage weighting procedure. The weights for the RTECS were developed from the weights that originally had been used in the 1987 RECS. These original weights were divided by the probability that a RECS household was selected into the RTECS sample. The probability that an individual 1987 RECS household was selected for the 1988 RTECS varied by the Secondary Sampling Unit (SSU) and the estimated vehicle annual mileage for the household as obtained from the RECS interview. Households were classified as a high-mileage household if the RECS estimate of the annual miles traveled of all household vehicles was 12,500 miles or more and a low-mileage household if otherwise. The RTECS selection probability or sampling rate is denoted by P , when P is defined as follows:

If the household was a high-mileage household then:

$$P = 545 / (\text{Number of RECS sample households per 10 million in SSU}).$$

If the household was not a high-mileage household then:

$$P = 365 / (\text{Number of RECS sample households per 10 million in SSU}).$$

If P exceeded 1.0, P was set equal to 1.0. The goal for the number of households to be sampled for RTECS was 2,900 households with 50 percent of these households considered high-mileage households. The equations for P given above were chosen with this goal in mind.

These RECS weights were appropriate for estimates of U.S. households as of November 1987 (the midpoint of the RECS data collection time period). Since the midpoint of the RTECS data collection period was July 1988, the RTECS weights were adjusted so that RTECS household counts were estimated at their presumed July 1988 levels. This was accomplished by use of poststratification. In poststratification, the survey weights in RTECS (and RECS) were adjusted by factors so that, within certain population subgroups, RTECS estimates of household counts would agree with those estimated from the CPS. Within each population subgroup or poststratification cell, the weight adjustment factor was computed as the CPS household count estimate divided by the RTECS household count estimate. (RTECS household count estimates are produced by summing RTECS survey weights.) The CPS estimates within the subgroups are called "control totals," and they are considered to be more reliable than the corresponding estimates from RTECS.

The poststratification cells were defined by a two-way contingency table. One margin represented metropolitan status within Census regions. This margin had 12 categories comprised of 4 Census regions (Northeast, Midwest, South, and West) and 3 metropolitan statuses (metropolitan in center city, metropolitan outside of center city, and nonmetropolitan). The other margin of the poststratification table contained three categories (one-person-male households, one-person-female households, and all other households). Thus, the poststratification table had a total of 36 cells. However, 36 separate weight-adjustment factors were not computed. Rather, the RTECS weights within these cells were adjusted by a limited "raking" procedure. The weights were first adjusted to agree with CPS totals for the Census region by metropolitan status margin, using 12 cells. Next the weights were adjusted to CPS totals for the household type margin using 3 cells. Finally, the weights were re-adjusted to CPS totals for the Census region by metropolitan status margin. Raking allows for the use of more sample units in computing each weight-adjustment factor, by not distributing them around too many cells. However,

the method is based on the assumption that there is no significant interaction between the margins of the poststratification table.

Data Editing Procedures

The following steps were undertaken to ensure the accuracy of the data. Step one in the review process was to verify the accuracy of the basic identifying information. Step two consisted of manually reviewing the questionnaire for completeness and logical consistency of selected patterns of response and to prepare the questionnaires for translation into machine-readable form. In the third step, the data were keyed into machine-readable format. Any inconsistencies in the skip patterns were automatically noted and resolved by one of the editors. In the fourth step, the keypunching of the data was 100 percent verified. During the fifth step, the data were machine edited to further ensure completeness, logical consistency and the legitimacy of coded values.

Comparisons were made of the vehicle characteristics provided by the respondent and the vehicle characteristics obtained from the VIN. When a discrepancy occurred the vehicle characteristics obtained from the VIN were usually used.

Report Preparation Procedures

Prior to a final data tape, a preliminary data tape was delivered to the EIA in August 1989. EIA data analysts reviewed and processed the data to prepare it for the final data tape. Crosstabulations were run, checked for internal consistency and compared with data from previous RTECS. Generally, inconsistencies were resolved by the survey contractor. As a quality control measure, selected tabulations were produced using two different software programs,

Table Producing Language (TPL) and Statistical Analysis System (SAS).

A final clean edited data tape of household vehicle survey data was delivered to the EIA in September of 1989. After the edited data tape was provided by the survey contractor, EIA data analysts further reviewed and processed the data to prepare it for release in the statistical reports. Statistical tables of aggregated data were produced and analyzed. The report text was based on these tables.

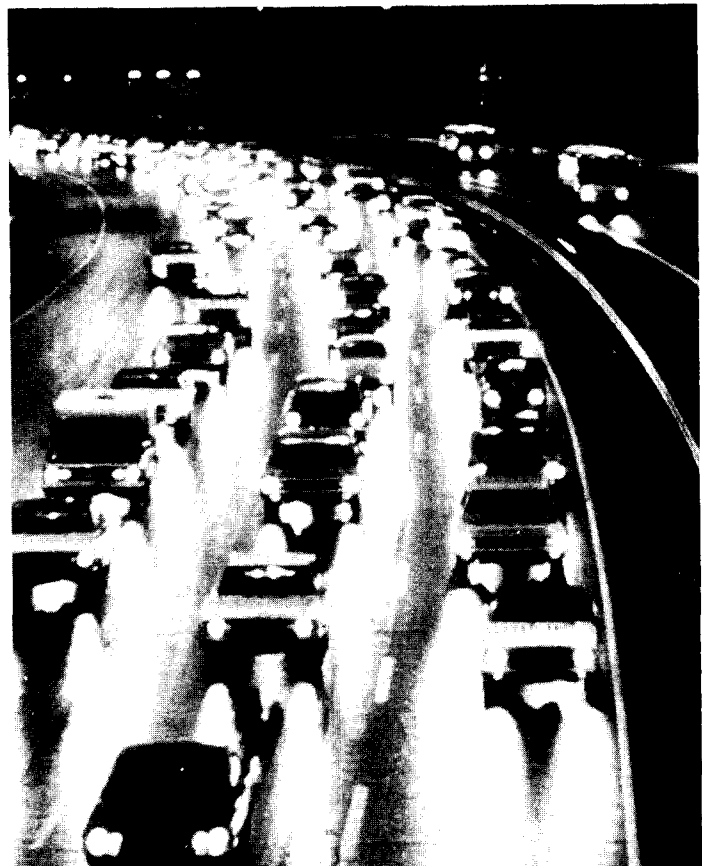
Confidentiality of Information and Public Use Tape Preparation

The EIA does not receive or take possession of the names or addresses of individual RTECS respondents or any other individually identifiable energy data that could be linked with information describing the household. All such identifiable information is maintained by the survey contractor.

Following the publication of the statistical report for the RTECS and the statistical reports for the RECS, a final data tape is prepared for release to the public. This tape contains both the housing characteristics and energy supplier data for the RECS and the vehicle data for the RTECS. Additional measures such as the stripping of all geographic identifiers except Census region and Census division, are taken at this time to further mask the data and to ensure that the identity of the individual respondent is kept confidential. At the culmination of these procedures, a final data tape is released to the public through the National Technical Information Service (NTIS). (See Appendix G, "Related EIA Publications on Energy Consumption" for information on how to order these tapes.)

Appendix B

Estimation Methodology



*Vehicle miles traveled are reported for
metropolitan and nonmetropolitan areas.*

Appendix B

Estimation Methodologies

Introduction

Statistics concerning vehicle miles traveled (VMT), vehicle fuel efficiency, in miles per gallon (MPG), and vehicle fuel consumption and expenditures are presented in this report. The methodology used to estimate these statistics relied on data from the 1987 Residential Energy Consumption Survey (RECS), the 1988 Residential Transportation Energy Consumption Survey (RTECS), the U.S. Environmental Protection Agency (EPA) fuel efficiency test results, the U.S. Bureau of Labor Statistics (BLS) retail pump price series, and the Lundberg Survey, Inc., price series for 1988.

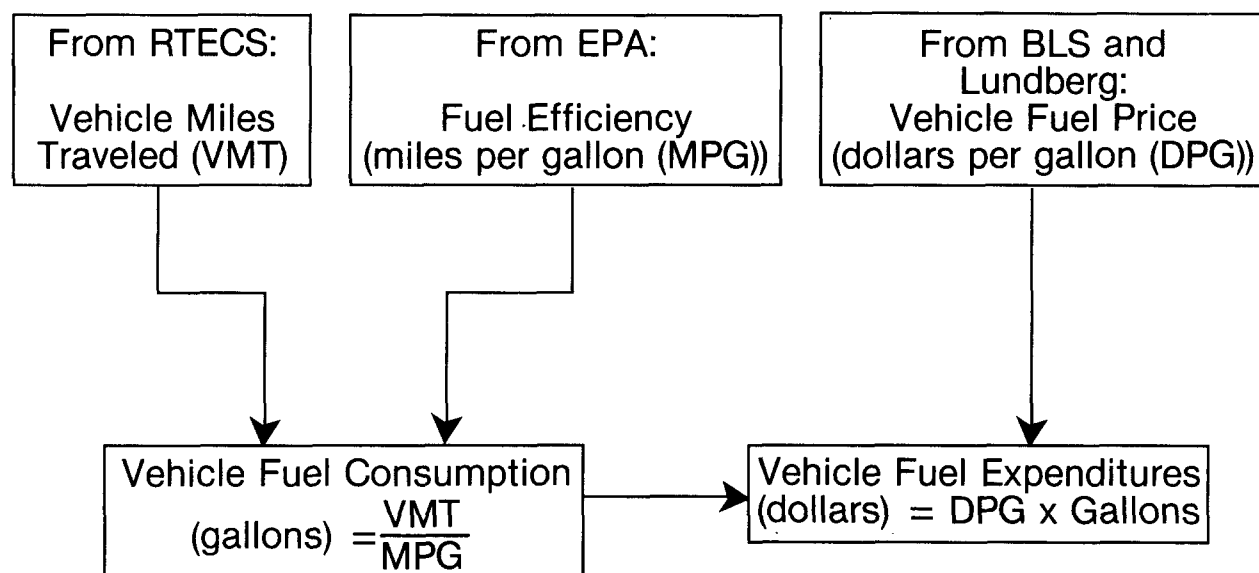
The estimation of these four statistics (VMT, vehicle fuel efficiency, vehicle fuel consumption, and vehicle fuel expenditures) occurred in several steps (Figure B1). First, for each RTECS vehicle, the VMT were determined from two actual odometer readings or imputed using data from the 1987 RECS. Second, the annual on-road fuel efficiency, given in terms of MPG was estimated using the questionnaire responses, decoded Vehicle Identification Number (VIN) data, EPA fuel efficiency test results, and the months that the vehicle was in use. The MPG were adjusted to account for the difference between EPA test values and on-road values. Third, estimated vehicle fuel consumption was derived by dividing the VMT by the estimated MPG. Finally, the estimated vehicle fuel expenditures were derived by multiplying the vehicle fuel consumption by the fuel price.

The following sections of this appendix describe the estimation procedures used for calculating the VMT, the MPG, the vehicle fuel consumption, the vehicle fuel prices, and the vehicle fuel expenditures. Also described in this appendix are the sources of data that were used in the estimation procedures.

The following terms are used throughout this appendix:

Terms	Definitions
EPA Composite MPG	The EPA dynamometer test procedure, performed on preproduction prototype vehicles, yields separate test values for EPA city and highway MPG. These city and highway MPG are often combined to form the "composite" MPG.
On-Road MPG	A composite MPG that was adjusted to account for the shortfall between the test value and the fuel efficiency actually obtained on the road. The adjustment did not take into account the driving patterns of individual drivers and seasonal differences.
In-Use MPG	MPG that were adjusted for seasonal differences and annual miles driven. Vehicles that are driven relatively few miles during the year are assumed to be driven mostly on short trips that involve frequent stops. Vehicles that are driven relatively many miles are assumed to be driven mostly on long trips where few stops are needed.
MPG Shortfall	A measure of the difference between actual on-road MPG and the EPA laboratory test MPG. Expressed as the ratio of test MPG to on-road MPG.

Figure B1. Estimation Schematic



Note: RTECS--Residential Transportation Energy Consumption Survey, EPA--Environmental Protection Agency, BLS--Bureau of Labor Statistics; and Lundberg--Lundberg Survey, Inc.
Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Vehicle Miles Traveled

When possible, VMT were determined for a sample vehicle by taking the difference between two odometer readings, which spanned a period of time. This method was used to determine VMT for 3,505 (57 percent) of the 6,169 RTECS sample vehicles. Attempts were made to obtain odometer readings during the RECS interviews, the Beginning-of-Year (B-O-Y) RTECS interview, the End-of-Year (E-O-Y) RTECS interview, and any time a vehicle was acquired or disposed. A "span" of odometer readings was the difference between two odometer readings. In most cases, this span was a B-O-Y to E-O-Y span, although due to an occasional nonresponse, only shorter spans were obtained, such as RECS to B-O-Y. Odometer spans of less than a full year were also obtained for vehicles that were either acquired or disposed of during the survey year.

The VMT that were assigned to each RTECS vehicle corresponded to the period of time that the vehicle was in possession by the sample household. In most cases, however, this period of possession did not correspond exactly with the beginning and ending dates for the odometer span. This was true even for vehicles with a complete B-O-Y to E-O-Y odometer span; because odometer cards were mailed to respondents in several distinct waves at the beginning and end of the RTECS survey; and because the exact dates of odometer readings were often left to the convenience of the respondents. Therefore, all VMT obtained from odometer spans were adjusted to correspond to the period of time that the vehicle was in possession by the sample household. A 2-step adjustment procedure was used. STEP 1 adjusted the odometer-span VMT to a standard annualized mileage covering 366 days (1988 was a leap year), and STEP 2 readjusted the annualized VMT to correspond to the exact period of time that the vehicle was in possession by the household. These adjustments took into account a typical distribution of VMT fractions among the different months of the year. Step 2 was performed only for vehicles that were not in the possession of the household for the entire calendar year 1988.

STEP 1:

This step adjusted the odometer-span VMT to a standard annualized VMT covering a full year, regardless of whether the span of odometer readings covered approximately 1 year or only a short span of time. Annualized VMT for vehicle i were computed as:

$$\text{Annualized VMT}_i = [\text{Odometer-Span VMT}_i] \times R_i$$

Where

$$R_i = \frac{1.0}{\sum_{j=so_i}^{eo_i} F_j},$$

and

F_j = Monthly VMT fractions from the standard distribution in Table B1

so_i = Month of starting odometer readings for vehicle i

eo_i = Month of ending odometer readings for vehicle i .

The starting and ending F_j were prorated according to the exact day of the month for the odometer readings. For example, if a final odometer reading was taken on September 15, then $(14/30) \times F_{SEP}$ was used.

Table B1. Distribution of Average Monthly Vehicle Miles Traveled Fractions

Month j	Average VMT per Vehicle	F _j
JAN	688	0.0728
FEB	697	0.0738
MAR	771	0.0816
APR	783	0.0829
MAY	832	0.0880
JUN	847	0.0896
JUL	868	0.0919
AUG	872	0.0923
SEP	800	0.0847
OCT	802	0.0849
NOV	756	0.0800
DEC	734	0.0777
Total	9,450	1.0000

Source: 1984 Petroleum Marketing Index (PMI) Survey, NPD Research Inc. The survey is a demographically and geographically balanced-quota sample of 4,100 households. Respondents maintained fuel purchase diaries for an average of 10 months.

STEP 2:

Once an annualized VMT was obtained from STEP 1 as described earlier, it was adjusted to correspond to the time period that vehicle i was in possession by the sample household as:

$$\text{VMT During Possession}_i = [\text{Annualized VMT}_i] \times R_i'$$

Where

$$R_i' = \frac{\sum_{j=sp_i}^{ep_i} F_j}{1.0},$$

and

F_j = Monthly VMT fractions from the standard distribution in Table B1

sp_i = Month starting possession of vehicle i by the household, or January 1988, whichever is later

ep_i = Month ending possession of vehicle i by the household, or December 1988, whichever is earlier.

If vehicle i was in the household for the entire year then sp_i = JAN and ep_i = DEC. If a vehicle was acquired or disposed of during the survey, the starting or ending F_j was prorated according to the appropriate day of the month.

Incomplete Odometer or VMT Data

For 1,341 sample vehicles (22 percent), no odometer span was available, although an estimate of annual VMT had been obtained from the respondent during the RECS interview. VMT for these vehicles were imputed from a regression on the estimated VMT obtained from the RECS. For another 1,323 sample vehicles (21 percent), no odometer span was available and a VMT estimate was not obtained during the RECS interview. VMT for these vehicles were imputed using a multiple linear regression model, where the independent variables were number of drivers, household income, age of household head, type of vehicle, and use of vehicle on the job. This regression was also used for imputing VMT for vehicles that were imputed as being acquired or disposed. Both of the regression models described above yielded estimates of annualized VMT. The STEP 2 adjustment described previously was then used to adjust this VMT to correspond with the time the vehicle was in the possession of the household.

Vehicle Fuel Efficiency

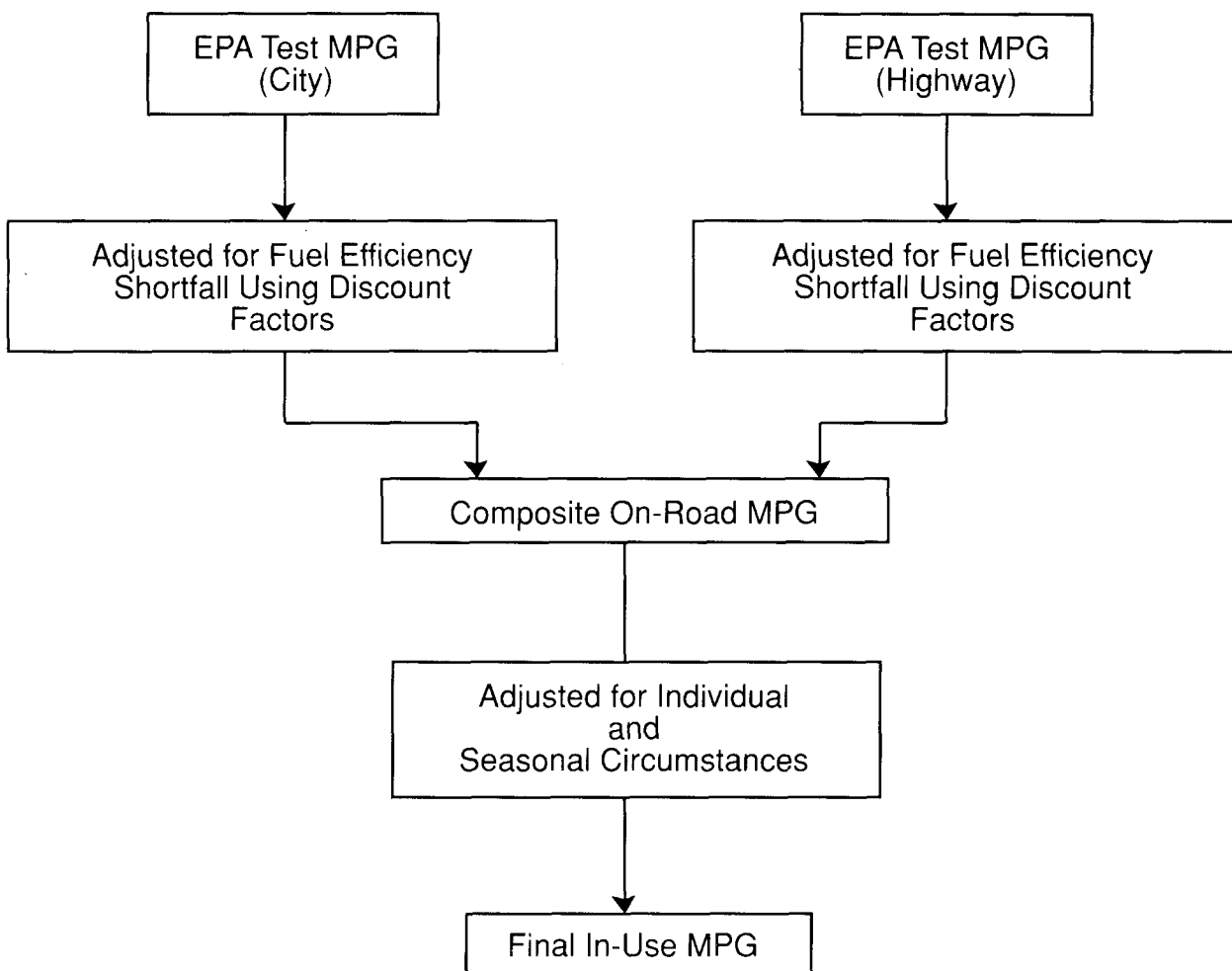
Fuel efficiency (MPG) must be estimated for each RTECS sample vehicle in order to estimate each vehicle's fuel consumption for the survey year. (Fuel consumption is estimated by dividing the VMT for time of possession, by the MPG.) Prior to 1988, the RTECS obtained actual fuel consumption data and on-road MPG from fuel purchase diaries maintained by the respondents. However, no fuel purchase diaries were used in the 1988 RTECS. Instead, the 1988 MPG were estimated using EPA laboratory test MPG that were adjusted to account for differences between actual on-road MPG and the EPA test MPG. This difference is known as MPG "shortfall." The feasibility of using shortfall-adjusted MPG in an RTECS survey was investigated by Lax (1987). That study verified that the method yielded unbiased MPG, when using a data base from a 1984 fuel purchase diary study performed by NPD Research, Inc. However, the adequacy of current shortfall adjustment methods for late 1980 through 1990 motor vehicle model years is an unresolved issue.

The RTECS sample vehicles were assigned EPA test MPG from the EPA Emissions Certification Files. Each record of the Certification Files contained EPA test MPG for each unique combination of vehicle attributes within a given make, model, and year. These attributes were (1) number of cylinders, (2) cubic inches of engine displacement (CID), (3) type of transmission (manual or automatic), (4) gasoline or diesel fuel, and (5) whether the vehicle's emissions control package met Federal or California standards. Each record of the Certification Files also contained the number of vehicles sold for each unique combination of attributes. The vehicle attributes needed to assign a test MPG for sample vehicles were obtained from the Vehicle Identification Number (VIN), and/or from the RTECS questionnaire responses when the VIN was unavailable. The VIN was decoded to yield the vehicle attributes, by use of the Highway Loss Data Institute's "Vindicator" software.

In addition to assigning test MPG, the EPA Certification Files were used to impute for missing vehicle attributes. Based on the nonmissing vehicle attributes obtained from the questionnaire and VIN, several records from the EPA Certification Files were usually found as potential "matches" to a given sample vehicle. A matching record was chosen from among the several applicable, with probability proportional to sales, using the sales figures on the EPA Certification Files. Once chosen, a record provided EPA test MPG (city and highway), as well as any vehicle attributes that were missing.

The 1988 RTECS used a sequential adjustment procedure where the EPA Composite MPG was adjusted first to an on-road MPG, and then to an in-use MPG. Figure B2 shows the MPG adjustments that were used to determine the final in-use MPG.

Figure B2. Miles per Gallon Adjustment Procedures



Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

The EPA Composite MPG

Beginning in the early 1970's, EPA measured fuel efficiency from tests that were conducted on a dynamometer to simulate actual driving conditions. By 1975, EPA had incorporated separate "city" and "highway" driving cycles into the test. The city and highway MPG were combined to form a "composite" MPG, that was then weighted according to sales of the production vehicles in order to assess compliance with Corporate Average Fuel Economy (CAFE) standards. The EPA Composite MPG is based on the assumption of a "typical" vehicle-use pattern of 55 percent city driving and 45 percent highway driving, and has become a convenient single fuel efficiency measure for analytical and regulatory purposes.

The EPA Composite MPG is defined as:

$$\text{MPG}_{(\text{EPA } 55/45)} = \frac{1}{0.55 \times \frac{1}{\text{MPG}_{(\text{EPA city})}} + 0.45 \times \frac{1}{\text{MPG}_{(\text{EPA highway})}}}$$

where:

$\text{MPG}_{(\text{EPA } 55/45)}$ = the composite MPG

$\text{MPG}_{(\text{EPA city})}$ = the fuel efficiency when vehicle use pattern is city driving

$\text{MPG}_{(\text{EPA highway})}$ = the fuel efficiency when vehicle use pattern is highway driving only.

Fuel Efficiency Shortfall

Fuel efficiency shortfall occurs when the fuel efficiency that is actually obtained while using the vehicle is lower than the EPA test results. Reasons for this shortfall are, (1) a result of the differences between EPA test vehicles and the vehicles actually in use and (2) the differences between EPA procedures for simulated driving conditions and actual driving conditions. For example, EPA test vehicles are prototypes that do not contain the wide variety of power-consuming accessories often found on vehicles sold to consumers. The test procedures also do not simulate the actual driving conditions that affect fuel efficiency such as speed and acceleration of individual drivers, road conditions, weather, and traffic. In the 1988 RTECS, adjustments for this fuel efficiency shortfall were made to the composite MPG ($\text{MPG}_{(\text{EPA } 55/45)}$) that were assigned to the sample vehicles.

Fuel efficiency shortfall was expressed in terms of the "Gallons Per Mile Ratio" or GPMR:

$$\text{GPMR}_i = \frac{\text{MPG}_{i(\text{EPA } 55/45)}}{\text{MPG}_i}$$

Where:

GPMR_i = Gallons per Mile Ratio for vehicle i

MPG_i = On-road MPG or in-use MPG for vehicle i, depending on the analysis

$\text{MPG}_{(\text{EPA } 55/45)}$ = EPA Composite MPG applicable to vehicle i.

If $\text{GPMR}_i = 1$ then there is no shortfall. If $\text{GPMR}_i > 1$ then there is a shortfall for vehicle i (That is, the on-road or in-use fuel efficiency is less than the fuel efficiency indicated by the EPA Composite MPG.) Note that GPMR_i

can represent shortfall with respect to either the on-road or in-use MPG_i , depending on the analysis being performed. $GPMR_i$ is commonly chosen as a measure of shortfall for the following reasons:

- A shortfall adjustment is most often thought of as a correction factor, or multiplicative constant, rather than as an additive correction. $GPMR_i$ satisfies this convention.
- Shortfall is usually dependent on a vehicle's fuel efficiency level. That is, shortfall is usually higher at high levels of $MPG_{(EPA\ 55/45)}$ than at low levels of $MPG_{(EPA\ 55/45)}$. Therefore, it is more informative to express the amount of shortfall relative to $MPG_{(EPA\ 55/45)}$ rather than as an absolute quantity.
- $GPMR_i$ is a linear function of $MPG_{(EPA\ 55/45)}$, and can be modeled using ordinary least squares linear regression.
- $GPMR_i$ is a transformation that stabilizes error variances for the purposes of least squares linear regression.

The On-road MPG

On-road MPG is a composite MPG that was adjusted to account for the shortfall between the EPA fuel efficiency and the actual fuel efficiency obtained on the road.

The EPA developed two general procedures for adjusting $MPG_{(EPA\ 55/45)}$ to an on-road value. One procedure bases the size of the adjustment on specific technology features of the vehicle. The other procedure uses simple wholesale MPG discount factors for all vehicles, regardless of technology class. Either of these procedures could be used to adjust $MPG_{(EPA\ 55/45)}$ to an on-road MPG value for use in the 1988 RTECS. The discount factor approach was used to obtain on-road MPG for the 1988 RTECS.

Shortfall Adjustment Based on Discount Factors

EPA developed discount factors that have widespread appeal because of their simplicity (Hellman and Murrell, 1985; Hellman and Murrell, 1984). For vehicle i , the discount factors yield on-road MPG that are 90% of the EPA city value, and 78% of the EPA highway value:

$$MPG_{i(\text{on-road,city})} = 0.90 \times MPG_{i(\text{EPA city})}$$

$$MPG_{i(\text{on-road,highway})} = 0.78 \times MPG_{i(\text{EPA highway})}$$

These discount factors are the ones used to produce the "sticker" MPG figures seen on vehicles on dealer lots, and are used to produce the DOE/EPA *Gas Mileage Guide*. The analysis behind the development of these factors was performed on a conglomerate data base with data from Ford Motor Company, General Motors, Chrysler Corporation, DOE, and EPA. The data base contained approximately 38,000 vehicle records with model years from 1979 through 1981 with some 1982 models included. The data base contained predominately American-made vehicles, but also included foreign vehicles as well. The technology mix was dominated by rear-wheel drive and carbureted vehicles, but contained some vehicles with front wheel drive or fuel injection. Vehicle records contained make, model, year, vehicle characteristics, the MPG as measured on the road, $MPG_{(EPA\ city)}$, and $MPG_{(EPA\ highway)}$. The data base also included the driver's perceptions of the proportion of their travel that was mostly urban (so called "city fraction"), and their average miles driven per day (AMPD).

Fuel economy shortfall is affected by the vehicle use pattern: city driving pattern is characterized by frequent starts and short trip lengths, while highway driving pattern is characterized by infrequent starts and long trips. AMPD is a good surrogate variable for representing these different driving patterns.

The city driving pattern was characterized by AMPD from 5 to 22 miles per day, while the highway pattern was characterized by AMPD's from 15 to 105 miles per day (Hellman and Murrell, 1984). City fraction and AMPD were used to split the data into two sets, one for development of the city discount factor, the other for

development of the highway factor. The "city" and "highway" data sets were each stratified by vehicle technology classes. Linear regression was performed within each stratum. GPMR was regressed on city fraction, AMPD, $MPG_{(EPA\ 55/45)}$, odometer reading, and average temperature. The fitted models were then weighted and combined across vehicle technology strata, to produce a single "city" shortfall model and a single "highway" shortfall model. The weights were used to increase the influence of those models that represented technology mixes expected to become more prominent in the future (e.g., front-wheel drive and fuel-injected vehicles). The discount factors were derived from the two weighted models set at average or typical values of the independent variables.

For each RTECS vehicle, discounted city and highway on-road MPG were computed and then combined to form an on-road 55/45 composite as follows:

$$MPG_{i(on-road,55/45)} = \frac{1}{0.55 \times \frac{1}{MPG_{i(on-road,city)}} + 0.45 \times \frac{1}{MPG_{i(on-road,highway)}}}$$

A shortfall ratio based on EPA discount factors was computed for each RTECS vehicle as follows:

$$GPMR_{i(on-road)} = \frac{MPG_{i(EPA\ 55/45)}}{MPG_{i(on-road,55/45)}}$$

The In-Use MPG

In-use MPG are MPG that are adjusted for individual driving circumstances. The on-road adjustments to $MPG_{(EPA\ 55/45)}$ discussed in the previous sections were "general" in that they did not take into account any effects on fuel economy that are due to the driver's individual circumstances. They, instead, utilized general attributes such as the technology features of the vehicle and average driving conditions. Fuel economy shortfall estimates can be refined for an individual vehicle by taking into account the following "in-use" effects.

- Urban versus rural driving pattern. That is, frequent starts and short trips as opposed to infrequent starts and longer trips. As mentioned in the previous section, a useful single variable for representing this effect is AMPD. High AMPD's usually represent mileage accumulated on the highway.
- Traffic congestion, which increases with population density.
- Seasonal temperature variations, especially for gasoline-carbureted vehicles.
- Humidity, which together with temperature, affects air-conditioner use.
- Differences among geographic areas of the country.
- Altitude.
- Wind.
- Road gradient and road surface conditions.

In general, the first four items are considered the most significant in-use influences (Crawford, 1983). In the cited study, shortfall variations as high as 25 percent or more occurred over the range of typical AMPD. Shortfall was 16 percent higher in urban areas than in completely uncongested areas, and was 12 percent higher in suburban areas. Shortfall varied seasonally (i.e., monthly) by 7 percent in the South and by 13 percent in the North.

Regression models were developed for use in adjusting $GPMR_{i(on-road)}$ to an in-use shortfall employing measurements of several in-use effects as the independent variables.

The regressions yielded a shortfall adjustment that was an additive one, as follows:

$$GPMR_{ij(in-use)} = GPMR_{i(on-road)} + \delta_{ij}$$

where:

$GPMR_{ij(in-use)}$ = the in-use shortfall ratio estimated for vehicle i and month j (j = 1...12),

$GPMR_{i(on-road)}$ = the on-road shortfall ratio estimated for vehicle i, from the above equations, and

δ_{ij} = an adjustment calculated for vehicle i and month j, from a regression model.

The regression model used for this RTECS follows:

$$\begin{aligned} \delta_{ij} = & 3.296 \{ (1/AMPD_{ij}) - (1/35.6) \} \\ & + \text{NORTH} \{ 0.050 \sin(j\pi/6) + 0.075 \cos(j\pi/6) \} \\ & + \text{SOUTH} \{ 0.030 \sin(j\pi/6) + 0.031 \cos(j\pi/6) \}. \end{aligned}$$

Where:

$AMPD_{ij}$ = Average Miles per Day for vehicle i and month j, typically 35.6 (i.e., 13,000 miles per year).

$\text{NORTH} = 1$ if the household is in the North.
0 if the household is not in the North.

$\text{SOUTH} = 1$ if the household is in the South.
0 if the household is not in the South.

This regression model was chosen because the independent variables that are important in explaining shortfall were readily available from the 1988 RTECS data. The model had two components. One component involved $AMPD_{ij}$ and represented the influence of individual driving patterns for a given vehicle and month. The other component represented the change in shortfall that occurred throughout the seasons, due to the annual temperature cycle. The original regression equation also contained a minor term which accounted for the influence of air-conditioner use during hot, humid weather. This term was dropped in the 1988 RTECS estimations because it involved the rather complex computation of "Discomfort Index" from NOAA weather records, and the slight additional precision was judged insufficient to warrant the additional processing expense. Additional terms representing geographic regional effects, and the natural logarithm of population density (people per square mile, to represent the influence of traffic congestion) were not considered because of the computational cost.

Once a $GPMR_{ij(in-use)}$ was estimated it was used to estimate the final in-use fuel economy for vehicle i and month j as follows:

$$MPG_{ij(in-use)} = \frac{MPG_{i(EPA\ 55/45)}}{GPMR_{ij(in-use)}}$$

The regression equation had separate seasonal components for the "North" and "South," because the difference between the winter shortfall and the summer shortfall was greater in the North than in the South. This difference can be seen in the model parameters. To define the North and South geographic areas the continental United

States were divided into 97 two-digit ZIP Code regions. These regions were grouped to form two aggregate regions ("North" and "South") according to average winter and summer temperatures, and seasonal shortfall trends.

Annual Vehicle Fuel Consumption

In the 1988 RTECS, consumption was calculated by dividing the annual VMT by the annual MPG. The following is a derivation of the annual consumption estimator.

The $MPG_{ij(in-use)}$ shown in the above section about fuel efficiency estimation procedures were final estimates of monthly in-use fuel economies for vehicle i , and could have been used for estimating monthly fuel consumptions and expenditures if monthly VMT were known. However, RTECS collected only annual VMT, as calculated from the B-O-Y and E-O-Y odometer readings. Nevertheless, the 1988 RTECS still made use of the $MPG_{ij(in-use)}$ by disaggregating the annual VMT of sample vehicles into monthly VMT.

The annual consumption for vehicle i can be thought of as the sum of the individual monthly consumptions:

$$C_i = \sum_{j=sp_i}^{ep_i} c_{ij}$$

Where:

C_i = Annual consumption of vehicle fuel for vehicle i , in gallons

sp_i = Month starting possession of vehicle i by the household, or January 1988, whichever is later

ep_i = Month ending possession of vehicle i by the household, or December 1988, whichever is earlier

c_{ij} = Consumption of vehicle fuel for vehicle i , during month j .

Consumption is calculated over only those months that vehicle i was reported to be owned or used by the household. In this sense, "annual" does not necessarily mean a full 12 months. This is an important point since fuel economy varies seasonally. If vehicle i was in the household for the entire year, then sp_i = JAN and ep_i = DEC.

Consumption for each month can be expressed in terms of monthly VMT and monthly fuel economy:

$$C_{ij} = \frac{m_{ij}}{mpg_{ij}}$$

Where:

m_{ij} = VMT for vehicle i , month j

mpg_{ij} = Fuel economy in miles per gallon for vehicle i , month j

so that:

$$C_i = \sum_{j=sp_i}^{ep_i} \frac{m_{ij}}{mpg_{ij}}$$

In the 1988 RTECS C_i was estimated by substituting the estimated $MPG_{ij(in-use)}$ for mpg_{ij} . The m_{ij} was estimated in RTECS by disaggregating the annual VMT from odometer readings into monthly VMT. The disaggregation was performed as follows:

$$m_{ij} = M_i \times f_{(i,j)}$$

Where:

M_i = Annual VMT for vehicle i , calculated using odometer readings and the two-step adjustment procedure discussed in the section titled "Vehicle Miles Traveled"

$f_{(i,j)}$ = Average fraction of "annual" VMT that was driven during month j , estimated for vehicle i

There is no single distribution of average monthly VMT fractions $f_{(i,j)}$. Rather, there was a family of distributions, the members of which were determined by the particular months a vehicle was owned or used by a household. According to this definition of monthly VMT fractions, no matter which months vehicle i was in a household, it was always true that:

$$\sum_{j=sp_i}^{ep_i} f_{(i,j)} = 1$$

The $f_{(i,j)}$ were derived from the F_j in Table B1 as follows:

$$f_{(i,j)} = F_j, \text{ if } sp_i = \text{JAN and } ep_i = \text{DEC.}$$

Otherwise

$$f_{(i,j)} = \frac{F_j}{\sum_{j=sp_i}^{ep_i} F_j}$$

Substituting $mpg_{ij} = MPG_{ij(in-use)}$ and $m_{ij} = M_i \times f_{(i,j)}$ into

$$C_i = \sum_{j=sp_i}^{ep_i} \frac{m_{ij}}{mpg_{ij}}$$

yields the following estimate of annual consumption for vehicle i :

$$C_i = \sum_{j=sp_i}^{ep_i} \frac{M_i \times f_{(i,j)}}{MPG_{ij(in-use)}}$$

The estimator of annual consumption in the above equation was constructed with 1988 RTECS data.

For vehicles that were acquired or disposed of during 1988, the estimator took into account seasonal differences in the overall fuel economy and the effects of these differences on the overall fuel consumption.

Substituting $MPG_{(EPA\ 55/45)}$ in the above equation, and slightly rearranging the terms, the estimator of consumption is:

$$C_i = \frac{M_i}{MPG_{(EPA\ 55/45)}} \frac{ep_i}{\sum_{j=sp_i} f_{(i,j)} \times GPMR_{ij(in-use)}}$$

A single "annualized" fuel economy that is analogous to the "annualized" MPG_i from previous RTECS, was estimated as:

$$MPG_{i(annualized)} = \frac{MPG_{(EPA\ 55/45)}}{\frac{ep_i}{\sum_{j=sp_i} f_{(i,j)} \times GPMR_{ij(in-use)}}}$$

Thus

$$C_i = M_i / MPG_{i(annualized)}$$

Annual Vehicle Fuel Expenditures and Price

Vehicle Fuel Expenditures

In the 1988 RTECS, fuel expenditures were calculated by multiplying the vehicle fuel consumption and the price of the vehicle fuel. The 1988 RTECS, unlike previous RTECS, did not collect vehicle fuel prices via the fuel purchase diaries. Instead each RTECS vehicle was assigned a price based on reported fuel type used in each vehicle. Gasoline prices were obtained from the BLS 1988 Retail Gasoline Pump Price Series. Diesel fuel prices were obtained from the Lundberg Survey, Inc. (See "Other Fuel Types" in this appendix for a discussion of the gasohol and propane prices.)

For the 1988 RTECS, a gasoline fuel price was assigned to each sample vehicle that used gasoline by using the BLS data for the type of gasoline that the respondent indicated was used in the vehicle. (See section on Gasoline Prices.) Respondents were asked if they purchased leaded or unleaded gasoline, and if unleaded, they were asked the grade. (See Appendix D, "Survey Forms.") The BLS prices are published by month, by Census region, and by type and grade of fuel. The BLS monthly prices (for the Census region in which the household lived) were averaged across the months that the vehicle was in the possession of the household. This yielded for each RTECS vehicle a single fuel price, P_i , dependent on the Census region, type and grade of gasoline, and the months that the vehicle was in the possession of the household. The annual fuel expenditures in dollars for each sample vehicle, E_i , was estimated by multiplying its assigned average fuel price, P_i , by its total consumption in gallons, C_i , as estimated in the previous section.

Type of Fuel Used

Table B2 provides the percentage distribution of RTECS vehicles by fuel type categories. In 1988, 84.9 percent of the 147.5 million RTECS vehicles used unleaded gasoline. The remaining 15.1 percent of vehicles used leaded gasoline, diesel fuel or other fuel types.

**Table B2. Distribution of Residential Transportation Energy Consumption Survey
Vehicles by Type of Fuel Used, 1988**

	Number of Vehicles (millions)	Percent of Vehicles
Total Vehicles	147.5	100.0
Type of Vehicle Fuel		
Gasoline	145.1	98.4
Leaded	19.9	13.5
Unleaded	125.2	84.9
Regular	80.7	54.7
Premium	36.9	25.0
Intermediate	5.2	3.6
Regular and Premium Equally	2.4	1.6
Diesel	2.1	1.4
Other Fuel .....	.3	.2
Gasohol .....	.1	.1
Propane .....	.2	.1

Notes: •Because of rounding, data may not sum to totals. •For a discussion of underreporting of gasohol see Appendix C, "Quality of the Data."

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Gasoline Prices

Prices published by the BLS survey are retail prices for leaded regular, unleaded regular, and unleaded premium gasoline. These prices are published monthly by Census region. The BLS Pump Price Survey is conducted in conjunction with the development of the Consumer Price Index (CPI). Prices are collected in 85 urban areas. The population covered excludes the institutional population and households located on military bases. The covered population includes approximately 85 percent of all U.S. households. The BLS uses a rotating sample of approximately 1,100 service stations.

Each vehicle in the 1988 RTECS that used one of the three gasoline types, was assigned an average of the monthly BLS region by fuel type prices (averaged over the months the RTECS household reported using their vehicle). The BLS "leaded regular" price was assigned to all vehicles that reported using leaded gasoline. Because the BLS survey did not publish a price for an intermediate grade of unleaded gasoline in 1988, an average of the BLS regular and premium unleaded prices was assigned to the 4 percent of RTECS vehicles that used an intermediate grade of unleaded fuel, and the 2 percent of RTECS vehicles that used both regular and premium unleaded gasoline equally.

Diesel Fuel Prices

Diesel fuel prices were obtained from the "Lundberg Letter-PS" published by Lundberg Survey, Inc. The Lundberg Survey, Inc. collects pump prices at retail service stations in approximately 80 major metropolitan markets. The survey includes about 15,000 service stations divided into 2 bimonthly panels. At least one city from every State is included. Service stations on military bases and in rural areas are excluded. Price data for both full- and self-service stations are published bimonthly. Regional prices are not published. All RTECS vehicles that used diesel fuel were assigned the same diesel fuel prices regardless of Census region.

For the RTECS, the following two steps were used to create diesel prices. (1) Bimonthly diesel fuel full-service and self-service prices, obtained from the Lundberg Letter-PS, were averaged to create monthly prices. (2) The monthly full- and self-service prices were then weighted and averaged to obtain overall diesel fuel prices. The weights used to create an average diesel fuel price from the full- and self-service prices were based on RTECS data on "type of service" (full-service or self-/mini-service) used when purchasing diesel fuel. For each vehicle monthly prices were averaged over the number of months the vehicle was in the household.

Other Fuel Type Prices

Approximately 0.3 million 1988 RTECS vehicles were powered by "other" types of fuel. Of these 0.3 million, 0.1 million) were gasohol powered and 0.2 million were propane driven. In the absence of applicable national estimates of the average price paid for gasohol and propane, the RTECS vehicles using "other fuel type" were assigned fuel prices using the same methodology as the most common group of vehicles in the survey--vehicles using regular unleaded gasoline. (See above for methodology assigning unleaded regular gasoline prices and Appendix C, "Quality of the Data" for a discussion of RTECS underestimation of other fuels.)

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Appendix C

Quality of the Data

$$\text{RSE}(X/Y) = \sqrt{\text{RSE}^2(X) + \text{RSE}^2(Y)}$$

Appendix C

Quality of the Data

Introduction

This appendix discusses several issues relating to the quality of the Residential Transportation Energy Consumption Survey (RTECS) data and to the interpretation of conclusions based on these data. The first section discusses undercoverage of the vehicle stock in the residential sector. The second section discusses the effects of using July 1988 as a time reference for the survey. The remainder of this appendix discusses the treatment of sampling and nonsampling errors in the RTECS, the quality of specific data items such as the Vehicle Identification Number (VIN) and fuel prices, and poststratification procedures used in the 1988 RTECS.

The quality of the data collection and the processing of the data affects the accuracy of estimates based on survey data. All the statistics published in this report such as total vehicle miles traveled (VMT) are estimates of population values. These estimates are based on observations from a randomly chosen subset of the entire population of occupied housing units. Consequently, the estimates always differ from the true population values. Because the RTECS is a sample survey, data from the 1988 RTECS are subject to various sources of nonsampling and sampling error.

Nonsampling error is a measure of variability due to the conduct of the survey. These errors can include: population undercoverage during sampling; questionnaire wording and format; response bias and variance; interviewer error; coding and/or keypunching error; and nonresponse bias. Nonsampling errors are treated in several sections of this appendix. The main section pertains to the imputation procedures used for item nonresponses, and the special treatment given to the fuel efficiency, reported in miles per gallon (MPG) of pre-1975 vehicles.

Sampling error is a measure of the variability in the data because a sample of households was surveyed rather than the entire population. The different

samples that could be selected would each produce different values for the survey statistics. Because the survey used probability sampling techniques, it is possible to estimate the size of the sampling error for any statistic. These estimates can be used as a guide in making inferences from the sample estimates to the total population. The final section on sampling error pertains to estimating the magnitude of the error and the presentation of sampling errors as row and column factors in the detailed tables of this report.

Noncovered Residential Vehicles

The RTECS is a subsample of the Residential Energy Consumption Survey (RECS). Therefore, any type of household not covered in the RECS would affect the type of household vehicles not covered in the RTECS. The following types of individuals or families were not covered by RECS and, hence, the vehicles corresponding to these households were not covered by RTECS.

- Families or individuals living in group quarters such as college dormitories, military barracks, or large boarding houses (10 or more unrelated adults).
- Families or individuals living in recreation vehicles or other vehicles.
- Families or individuals with no fixed address.

The effect of these omissions is an underestimation of the total number of vehicles in the residential sector and an underestimation in the number of miles driven, gallons consumed, and dollars spent.

July 1988 as a Reference for Number of Households

The design of RTECS calls for households to be followed for the 1988 calendar year. Consequently, households formed during 1988 are represented in

the sample by households that existed at the time the 1987 RECS was fielded. Hence, RTECS may have an over-representation of established households at the expense of newly formed households.

The decision to follow households for the entire year and not add a sample of households formed during 1988 means that as the survey progressed through 1988, the estimate of the number of vehicles accumulated a negative bias. This happens for several reasons.

- When established households separate, only part of the household is followed by RTECS. If the part of the household that is not followed takes a vehicle with them, that vehicle is counted as a disposed vehicle.
- Any vehicle acquired by a household member that leaves the household is not included in the RTECS.
- The number of households for the 1988 RTECS is set equal to the Current Population Survey (CPS) estimate of the number of households as of July 1988. (See the section below on poststratification.) RTECS does not provide for an increasing number of households from January to December. The household number for July is the number used for the entire year. This has the effect of overestimating the number of households and vehicles for January 1988 and underestimating the number for December 1988.

Nonsampling Error

Nonsampling errors are due to the conduct of the survey, and include both random errors and systematic errors or biases. The magnitudes of nonsampling biases cannot be estimated from the sample data. Thus, avoidance of systematic biases is a primary objective of all stages of survey design. (See Appendix A, "How the Survey was Conducted" for a discussion of procedures implemented to minimize all types of nonsampling errors.) Subsequent to conducting a survey, problems of unit nonresponse and item nonresponse need to be addressed. The treatment in the RTECS of these types of errors are discussed in separate sections below.

Unit Nonresponse

Unit nonresponse is the type of nonresponse that occurs when no data are available for an entire sampled household. Most unit nonresponse cases are caused by the unavailability of the respondent or the respondent's refusal to cooperate.

Unit nonresponse for the 1988 RTECS must be addressed in the context of the unit nonresponse for the 1987 RECS, since the 1988 RTECS sample was drawn from households that responded to the 1987 RECS. Thus, in all cases, at least the RECS data were available for every RTECS household, therefore, no RTECS household was a nonrespondent. Generally weight adjustment was the method used to reduce unit nonresponse bias in the RECS statistics and that adjustment carried over automatically to the RTECS subsample. (See *Housing Characteristics 1987* (published May 1989), DOE/EIA-0314(87) Appendix A, for a discussion of unit nonresponse adjustment.)

Imputation Procedures for Item Nonresponse

Item nonresponse occurs when the respondents do not know the answer or refuse to answer a question, or when an interviewer does not ask a question or does not record an answer. To facilitate "full-sample" data analyses, imputations were made to provide the most probable responses when responses were missing. The following imputation techniques were used: hot-decking, predictive mean matching and regression.

Hot-deck Procedure

The most commonly used technique of imputation for the RTECS was the hot-deck procedure. In hot-decking, when a certain response is missing for a given household or vehicle, another household or vehicle called a donor is randomly chosen to furnish its reported value for that missing item. The value is then assigned to the nonrespondent household or vehicle. To serve as a potential donor, a household or vehicle had to be similar to the nonrespondent in characteristics correlated with the missing item.

The RTECS items that were imputed using the hot-deck procedure were pre-1975 vehicle characteristics and fuel grade. Household demographic items such as family income, and ethnic background were hot-decked as part of the RECS. (See *Housing Characteristics 1987* (published May 1989), DOE/EIA-0314(87) Appendix C, for a discussion of imputation of household characteristics.)

Predictive Mean Matching

Predictive mean matching was used for imputing changes in vehicle stock to households when those households were not followed for the complete duration of the RTECS. Changes to the vehicle stock were defined as acquisitions, dispositions, a combination of both, or no change. In an ideal RTECS, a beginning vehicle stock inventory reported in the 1987 RECS interview would be followed throughout the 1988 RTECS calendar year and, at the time of each RTECS contact, changes in vehicle stock would be reported. However, because in some cases, it was impossible to follow a household for the entire RTECS year due to attrition, it was unknown if, for these households, vehicle stock changes were made.

In the 1988 RTECS, 887 households (30 percent) were not followed for the entire RTECS calendar year. This figure represents the percentage of households that had imputations with respect to change in their vehicle stock. Within these households, 234 vehicles (3.9 percent) of the 5,935 total RTECS sample vehicles were imputed as acquisitions and 220 (3.7 percent) of the total sample vehicles were imputed as disposed vehicles.

To impute vehicle stock changes in the 1988 RTECS, logistic regression equations were used to compute a predicted probability (or propensity) of a household making a change in the vehicle stock during the RTECS data year. These propensities were computed for all households in the data set including households lost through attrition. For each household that was not followed during the year, a donor household was found by selecting the respondent household with a propensity closest in value to the "lost" household. This procedure of

matching a donor and recipient using a prediction model is called "predictive mean matching." Once a donor household was found, it provided all vehicle stock changes, if any, to the "lost" household.⁵ Logistic regression equations were used for predicting the probability of a vehicle stock change. The independent variables were the following five household attributes: (1) education level of the head of household; (2) age of head of household; (3) number of drivers in the household; (4) total number of vehicles; and (5) vintage of household's newest vehicle. Backward elimination was used to fit the final models. The binary response variable took a value of 1 if the respondent changed vehicle stock, and 0 if otherwise. The equations were independently fitted and employed within categories defined by (1) time of last contact which could be the RECS interview, the RTECS Beginning-of-Year (B-O-Y), interview or the RTECS Mid-Year (M-Y) interview, and (2) the number of vehicles in the household at time of last contact (expressed as two categories: one vehicle, and more than one vehicle). Use of these categories excluded the possibility, for example, of a recipient household (one that was not tracked) with one vehicle being matched to a donor household that had disposed of two of its three vehicles. To achieve additional consistency the matching procedure was carried out within geographic cells defined by the nine Census divisions and Metropolitan Statistical Area (MSA) versus non-MSA.

If a recipient household was imputed to have acquired a vehicle, certain attributes for that vehicle were "borrowed" from the donor household. These attributes were a date of acquisition, date of disposal, vehicle type, vehicle make, model and year, number of cylinders, type of transmission, type of fuel and MPG.

In addition to imputing vehicle acquisitions, some recipient households were imputed to have disposed of some of their vehicle stock. This occurred when a recipient household was matched to a donor that had disposed of some its vehicle stock. The recipient household was imputed to have disposed of the same number of vehicles that the donor household had disposed of. The vehicles imputed as disposed of by the recipient household were chosen

⁵Little, R., 1988, "Missing-Data Adjustments in Large Surveys", *Journal of Business and Economic Statistics*, pp. 287-301.

so that they occupied the same rank in terms of model year, as the vehicles disposed of by the donor household (for example, the oldest vehicle, or the next oldest).

The predictive mean matching procedure was validated by simulating the imputation task. Of the 2,366 1985 RTECS donor households, 600 households were randomly selected to act as recipient households. Since the actions of these 600 pseudo-recipient households were known, a direct comparison was made between the known action and the predicted action.

Overall, the prediction accuracy at the national level was 92.3 percent. That is, the distribution of the observed stock changes among the 600 recipient households differed from the distribution of the predicted vehicle stock changes by 46 households. At the regional level, the prediction accuracy was 78.4 percent in the Northeast Census Region, 84.4 percent in the Midwest Census Region, 71.5 percent in the South Census Region and 79.0 percent in the West Census Region.

Predictive mean matching could not be used for households with zero vehicles in stock. There was an insufficient number of households with zero vehicles to achieve significant estimates of parameters for the logistic regression models. For households without vehicles, that were lost from the survey through attrition, a hot-deck procedure was employed for imputing changes to the vehicle stock.

Regression Procedures

Multiple regressions were used to impute for annual VMT for vehicles imputed as acquired, since two odometer readings were not available in these cases. Simple linear and multiple regressions were also used to impute annual mileage for other vehicles when two odometer readings were not obtained. (See Appendix B, "Estimation Methodologies" for details on the imputation of VMT).

Imputation of Vehicle Characteristics for 1975 and Later

Vehicle characteristics that were missing for vehicle model years 1975 and later were imputed using either the VIN or the Environmental Protection Agency (EPA) certification files (CERT files) containing laboratory test results of MPG. When

the vehicle characteristic was missing from the questionnaire but the VIN was available, the characteristics from the VIN were used. Additionally, when there was a discrepancy between the VIN and the RTECS respondent's answer, the VIN generally overrode the response provided by the respondent. If both the VIN and questionnaire responses were missing, the vehicle characteristics were imputed from the CERT files. An individual record from the CERT files was chosen as a donor for a recipient sample vehicle by first narrowing the choice by using the known vehicle characteristics of the recipient vehicle, and then second, selecting a single CERT record according to probabilities proportional to vehicle sales. The type of fuel (gasoline or diesel) used in the vehicle was also imputed using the EPA CERT files (See Appendix B, "Estimation Methodologies" for more details on the use of EPA CERT files in the 1988 RTECS.)

Imputation of Vehicle Characteristics and MPG for Pre-1975 Vehicle Model Years

For all RTECS sample vehicles, the questionnaires and VIN's jointly provided the following vehicle characteristics: make, model, model year, number of cylinders, engine displacement (liters or cubic inches), transmission type (automatic or manual), and fuel system type (carbureted, gasoline fuel injected, or diesel). Many of these characteristics were used to assign EPA test MPG to the sample vehicles. EPA records, in the form of CERT files, were used to provide these MPG, as well as to provide any vehicle characteristics that were not obtained from the questionnaire or VIN (See Appendix B, "Estimation Methodologies" for more details.)

The EPA CERT files, however, have only been available since 1975. The 1988 RTECS sample contained 828 pre-1975 vehicles (13 percent), and for these vehicles, missing characteristics were imputed by a hot-deck procedure using 1988 respondents as donor vehicles. Each donor and recipient vehicle was paired on as many of the following characteristics as possible: make, model, model year, transmission type, number of cylinders, and engine displacement.

The MPG for pre-1975 vehicles were imputed using a cold-deck procedure. The donor vehicles were respondents from the 1985 RTECS. Fuel purchase

diaries were used in the 1985 RTECS, therefore, no shortfall adjustments were needed for the MPG. Cold-decking was performed within categories defined by make, model, model year, transmission type, and number of cylinders, with collapsing of categories performed where necessary. For example, MPG could be selected from donor vehicles of a certain size class in either the Pontiacs or the Chevrolets, if they shared similar model years, transmission type, and the General Motors 350 cubic inch V-8 engine. However, it appeared that a greater share of the variability in the 1985 RTECS MPG was due to individual driving habits, automotive maintenance and diary keeping, rather than to vehicle characteristics.

Quality of Specific Data Items

Vehicle Identification Number

The VIN is a unique combination of numbers and letters that when decoded provide the characteristics of a particular vehicle. Since 1954, the VIN have been used by American automobile manufacturers. Beginning with the 1981 model year, a standard 17-character VIN was assigned to all vehicles sold in the United States. VIN's were obtained for most of the vehicles in the 1988 RTECS. The vehicle characteristics from decoded VIN's were employed in the 1988 RTECS to enhance the accuracy of reported vehicle characteristics. These characteristics were used in determining vehicle fuel efficiency based on the EPA certification files of test laboratory MPG estimates (See Appendix A, "How the Survey Was Conducted" for a discussion of the VIN.)

There were three occasions where attempts were made to obtain the VIN's: the RECS interview; the Beginning-of-Year (B-O-Y) interview; and the End-of-Year (E-O-Y) interview.

A computer software program, VINDICATOR, from the Highway Loss Data Institute, was used to decode the VIN's. For VIN's that could not be decoded immediately using this program, a computer routine was developed to correct for common errors in the transcription of VIN's. The vehicle characteristics produced for these "fixed" VIN's were then carefully compared to respondent information. Approximately 200 VIN's were salvaged using this routine.

Overall, the collection of the VIN was a highly successful endeavor that yielded quality data. VIN's were obtained for 4,573 (77 percent) of the 5,935 total sample vehicles. Of the 4,573 obtained VIN's, 3,729 (82 percent) were considered "good" VIN's. In summary, "good" VIN's were obtained for 3,729 (63 percent) of the 5,935 sampled vehicles. (A good VIN was a VIN that did not require correcting for common transcription error before it could be decoded.)

Vehicle Fuel Price and Expenditures

Vehicle Fuel Price: In the 1988 RTECS, compared to previous RTECS, the fuel price data were not collected via fuel purchase diaries. Instead, fuel prices were determined from Bureau of Labor Statistics (BLS) Retail Pump Average Gasoline Prices and the Lundberg Survey, Inc., prices. (See Appendix B, "Estimation Methodologies" for a discussion of the sources of vehicle fuel prices and the assignment of specific prices to the RTECS data.)

To validate the 1988 RTECS price methodology prior to the 1988 RTECS, the 1985 RTECS gasoline prices were recalculated and analyzed using the new 1988 methodology (BLS price data). Results of this analysis suggest that if the 1985 BLS price data had been used in 1985 instead of fuel purchase diary data, the average vehicle fuel price reported for the 1985 RTECS would have increased by approximately 2 cents per gallon.

For this analysis, only the prices for unleaded regular gasoline, unleaded premium gasoline, and leaded regular gasoline were recalculated. The prices for leaded premium, diesel, and other fuels were left equal to the prices used in the 1985 RTECS.

The BLS prices that were used for recalculating the 1985 RTECS prices were monthly 1985 regional retail gasoline prices for leaded regular, unleaded regular and unleaded premium. The prices were averaged across months for each of the above fuel types within each of the four Census regions. One of these average prices was assigned to each of the RTECS vehicles depending on Census region and on vehicle fuel type used.

Table C1 presents the BLS prices, (monthly prices were for 1985), with the corresponding average

Table C1. Average Bureau of Labor Statistics Gasoline Prices and 1985 Residential Transportation Energy Consumption Survey Prices by Census Region and Gasoline Type

Census Region and Fuel Type	Average Price	
	1985 RTECS	1985 BLS ^a
Total U. S.		
Total	\$1.1805	\$1.1969
Unleaded Regular	1.1848	1.2001
Unleaded Premium	1.2945	1.3396
Leaded Regular	1.1080	1.1128
Leaded Premium	1.3087	b
Diesel	1.1845	b
Other	1.1702	b
Northeast		
Total	1.2033	1.2082
Unleaded Regular	1.1931	1.2000
Unleaded Premium	1.3151	1.3327
Leaded Regular	1.1358	1.1243
Leaded Premium	1.3220	b
Diesel	1.2123	b
Other	1.2209	b
Midwest		
Total	1.1831	1.2098
Unleaded Regular	1.1916	1.2185
Unleaded Premium	1.2838	1.3572
Leaded Regular	1.1244	1.1333
Leaded Premium	1.2495	b
Diesel	1.1862	b
Other	1.1965	b
South		
Total	1.1620	1.1847
Unleaded Regular	1.1615	1.1805
Unleaded Premium	1.2795	1.3302
Leaded Regular	1.0806	1.0927
Leaded Premium	1.2333	b
Diesel	1.1706	b
Other	1.1112	b
West		
Total	1.1909	1.1938
Unleaded Regular	1.2075	1.2091
Unleaded Premium	1.3300	1.3562
Leaded Regular	1.1170	1.1153
Leaded Premium	1.3985	b
Diesel	1.1885	b
Other	1.2040	b

^aBLS average prices in this table were derived by assigning BLS prices to the 1985 RTECS sample vehicles, then producing national averages using the 1985 RTECS sample weights.

^bPrices for these fuels were not collected by BLS, therefore, the 1985 RTECS prices were used.

prices from the 1985 RTECS. Overall, the BLS prices compared well with the corresponding average regional fuel prices from RTECS. The largest difference corresponded to unleaded premium gasoline.

While there was general consistency between the BLS prices and the 1985 RTECS prices, the differences that did exist may have stemmed from the differences in the two survey populations and survey collection procedures.

- The BLS population (approximately 85 percent of the total U.S. population) consisted of the U.S. urban, noninstitutional population excluding households living on military bases. The RTECS population represented both urban and rural areas and included military bases.
- BLS prices were based on prices gathered from service stations. The 1985 RTECS prices were obtained from the survey households.
- The BLS sample was a rotating sample of service stations. Every year approximately one-fifth of the service stations in the sample were replaced with service stations that consumers reported using in that year's "Point of Purchase Survey" conducted by the BLS. Thus, the BLS prices included service stations where consumers currently purchased fuel as well as stations where they had previously purchased fuel. The RTECS prices were based entirely on the service stations where consumers were currently purchasing their vehicle fuel.

Vehicle Fuel Expenditures: Vehicle fuel expenditures were calculated by multiplying the price paid for fuel by the quantity of fuel used. Expenditures per household were the sum of the expenditures for each vehicle in the household. To assess the effect of the 1988 RTECS price methodology on vehicle fuel expenditures, the 1985 household vehicle fuel expenditures were recalculated using the 1985 BLS price data. Table C2 compares average expenditures by fuel type and Census region using both sources of price data.

The use of BLS prices for the 1985 RTECS would have increased the per household expenditures for vehicle fuel from \$1,274 per year to \$1,292 per year. The changes in expenditures reflect differences in the average price of gasoline between the new 1988

methodology and the 1985 RTECS methodology since the average consumption used to calculate the expenditures comes from the RTECS data under the new and original methodologies. The estimated total 1985 U.S. expenditures for vehicle fuel increased from 99.1 billion dollars to 100.4 billion dollars when the 1988 methodology was applied to the 1985 RTECS data.

The 1988 RTECS price methodology seemed to have little effect on the standard errors of expenditure statistics. When the 1985 RTECS prices were recalculated using 1985 BLS price data, the standard errors of the expenditures were close to the standard errors reported using the 1985 RTECS fuel purchase diary data. While the standard errors of the fuel prices were reduced, in some cases by 50 percent, the variability in fuel prices was very small relative to the variability in gallons of fuel consumed. Therefore, the standard errors of the vehicle fuel expenditures were largely controlled by the variability in gallons of fuel consumed.

Gasohol

In the 1988 RTECS, there was no category for "gasohol" in the detailed tables showing "Type of Fuel Purchased" but there is reason to believe that a small portion of the 81.1 billion gallons of gasoline was gasohol since an estimated 8,138 gallons of gasohol was sold in 1988. This estimate was derived from Federal Highway Administration Statistics (Department of Transportation, Washington, D.C., *Monthly Gasohol Reported by States--1988*, Table MF-33GLA). Only a few 1988 RTECS households reported purchasing gasohol. Gasohol, a mixture of 10 percent ethanol and 90 percent gasoline, is not sold under the name "gasohol". It is sold as "ethanol blends." Given the disparity between the few households reporting purchasing gasohol and the amount of gasohol sold, it does seem likely that some households that reported that they bought gasoline actually bought "gasohol" or "ethanol blends," resulting in an underestimation of the amount of gasohol consumed in 1988. Whether the use of "ethanol blend" in the questionnaire in place of "gasohol" would have increased reports of the alcohol fuel is speculative.

Sampling Error

The random differences between the survey estimates and the true population value, that occur because of the particular sample that was selected by

Table C2. Average Bureau of Labor Statistics Vehicle Fuel Expenditures and 1985 Residential Transportation Energy Consumption Survey Vehicle Fuel Expenditures by Census Region and Gasoline Type

Census Region and Fuel Type	Average Expenditures	
	1985 RTECS	1985 BLS ^a
U. S.		
Total	\$1,274	\$1,292
Unleaded Regular	686	695
Unleaded Premium	213	220
Leaded Regular	341	342
Leaded Premium	10	^b
Diesel	22	^b
Other	2	^b
Northeast		
Total	1,169	1,174
Unleaded Regular	694	698
Unleaded Premium	225	228
Leaded Regular	232	229
Leaded Premium	6	^b
Diesel	12	^b
Other	1	^b
Midwest		
Total	1,266	1,294
Unleaded Regular	724	741
Unleaded Premium	164	174
Leaded Regular	352	355
Leaded Premium	5	^b
Diesel	17	^b
Other	3	^b
South		
Total	1,321	1,347
Unleaded Regular	659	670
Unleaded Premium	281	292
Leaded Regular	348	352
Leaded Premium	10	^b
Diesel	21	^b
Other	2	^b
West		
Total	1,304	1,307
Unleaded Regular	678	679
Unleaded Premium	147	149
Leaded Regular	418	417
Leaded Premium	21	^b
Diesel	39	^b
Other	2	^b

^aBLS average expenditures in this table were derived by assigning BLS fuel type by region prices to the 1985 RTECS sample vehicles, then producing expenditure averages by using the 1985 RTECS quantities of vehicle fuel consumed.

^bPrices for these fuels were not collected by BLS, therefore, the 1985 RTECS prices were used in the computations.

chance are known as sampling errors. The average sampling error, averaged over all possible samples, should be zero. Although the sampling error is nonzero and unknown for the particular sample chosen, the sample design permits sampling errors to be estimated. The typical magnitude of the sampling error is measured by the "standard error" of the estimate. Standard errors in this report are given as percents of their estimated values, that is, as relative standard errors (RSE). The RSE is also known as the coefficient of variation.

For a given survey statistic, Y , the relative standard error, $RSE(Y)$ is given by:

$$RSE(Y) = (S_Y/Y) \times 100.$$

The standard error of Y is S_Y . Therefore:

$$S_Y = RSE(Y) \times Y/100.$$

The following sections provide a discussion of the procedure used to estimate sampling variances as well as an explanation and example of the procedures used to calculate approximate RSE's for each statistic shown in Tables 6 through 23 in the "Detailed Statistics" section of this publication.

Balanced Half-Sample Replication

For some surveys a convenient algebraic formula for computing variances can be obtained. However, the RECS (of which the RTECS is a subsample) used a multistage area sample design of such complexity that it is virtually impossible to construct an exact algebraic expression for estimating variances (See *Housing Characteristics 1987* (published May 1989), DOE/EIA-0314(87) Appendix A). Instead, the method used to estimate sampling variances for this survey was balanced half-sample replication. This numerical method involves pairing primary sampling units (PSU) in the strata so that differences between the members of each pair can be used to build an estimate of sampling variance. The strata were collapsed to 85 new strata to achieve this pairing of PSU's. Of these 85 strata, 44 each contained two nonself representing PSU's belonging to the same Census division, with one PSU constituting each member of a pair. Of the remaining 41 strata, 32 were each composed of one self-representing PSU; that is, they consisted of large metropolitan areas that came into the sample with certainty. In each of the latter strata, all of the PSU's were treated as a composite PSU, while the segments within the

composite PSU were segregated into two groups representing the two members of a pair. There was no between-PSU component of variance for self-representing PSU's. The nine remaining strata contained non-self-representing PSU's that were treated as if they were self-representing PSU's. These nine strata were in separate Census divisions, and were not collapsed to form pairs of non-self-representing PSU's due to a desire to restrict pairing to within the nine Census divisions, and also due to the desire to treat Alaska and Hawaii as two separate and unique strata.

Balanced half-sample replication involved repeatedly drawing pair members from the 85 strata. Each replication is called a "half-sample" because only one member of the pair within each of the 85 strata was selected. The poststratification procedure described in Appendix A, "How the Survey Was Conducted" was performed independently for each half-sample, so that the resulting variance estimates would reflect the benefits of poststratification. The sample units drawn into each half-sample and adjusted by poststratification can produce unbiased survey statistics based on roughly one-half of the data. Using different combinations of members from the 85 pairs, it is possible to produce a total of $2^{85} = 3.9 \times 10^{25}$ unique half-samples.

Although desirable for good variance estimation, a large number of half-samples would be computationally infeasible. However, the method of balanced half-sample replication allows a small number of half-samples (approximately equal to the number of strata) to produce estimates of variance that are identical to estimates based on all possible unique half-samples for linear survey statistics. The use of ratio adjustments such as poststratification means that even a statistic giving the number of households in a category is not a linear statistic. For nonlinear survey statistics, the variance estimate computed using the method of balanced half-samples is approximately equal to the variance estimate computed using all possible half-samples. With this balancing method each half-sample is constructed by using an orthogonal matrix to control the selection of pair members from strata. For the RTECS, 128 balanced half-samples were used in variance estimation.

The variances are estimated from the 128 half-sample-based statistics in the following way. Let Y' be a survey estimate of characteristic Y for a certain

category of housing units (for example, total consumption of vehicle fuel in the West Census Region). Then, the estimated variance of Y' is given by:

$$S_{Y'}^2 = \frac{1}{128} \sum_{i=1}^{128} (Y_i' - Y')^2,$$

where Y_i' is the i^{th} half-sample estimate of Y . The standard error of Y' is given by:

$$S_{Y'} = \sqrt{S_{Y'}^2}$$

Row and Column Factors

RSE's were calculated for all statistics in this publication, although they cannot be presented due to space limitations. However, the RSE's are presented in a generalized form. The method of presenting generalized RSE's of statistics uses a row and column factors. This method allows the readers to calculate an approximate RSE for each statistic. To estimate the RSE of a statistic in the i^{th} row and j^{th} column of a particular table, the approximation $RSEA_{ij}$ for the original RSE_{ij} is given by:

$$RSEA_{ij} = R_i \times C_j$$

where:

R_i is the RSE row factor given at the right-most margin of row i in the tables, and C_j is the RSE column factor given at the top of column j .

The following example illustrates this procedure:

Referencing the second row of the table (Figure C1) labeled "Northeast" and the third column labeled "Vehicle Miles Traveled (billion)" yields an estimate of 274 billion miles driven. The RSE row factor is $R_2 = 4.50$, and the RSE column factor is $C_3 = 1.060$. The approximate RSE for the estimate is, therefore,

$$RSEA_{23} = 4.50 \times 1.060 = 4.77 \text{ percent.}$$

The standard error derived from row and column factors can be used to construct confidence intervals as in Figure C1, and to perform hypothesis tests by standard statistical methods. However, because

the generalized variance procedure gives only approximate RSE's, such confidence intervals and statistical tests must also be regarded as only approximate.

For the example above, the RSE determined directly by the half-sample method is actually 4.69 percent, not 4.77 percent.

Derivation of Row and Column Factors

The row and column factors are determined from a two-factor analysis of the table of RSE's on the basis of the two-way model,

$$m = \overline{(\log RSE)}$$

$$a_i = \overline{(\log RSE)}_i - \overline{(\log RSE)}$$

$$b_j = \overline{(\log RSE)}_j - \overline{(\log RSE)}$$

Where:

$\overline{(\log RSE)}$ = the mean of $\log RSE_{ij}$ over all rows i and columns j ,

$\overline{(\log RSE)}_i$ = the mean over all columns j for a particular row i , and

$\overline{(\log RSE)}_j$ = the mean over all rows i for a particular column j .

The row and column RSE factors are then computed as:

$$R_i = \text{antilog}(m + a_i) = \text{antilog}(\overline{(\log RSE)}_i)$$

$$C_j = \text{antilog } b_j =$$

$$\text{antilog}(\overline{(\log RSE)}_j - \overline{(\log RSE)}).$$

The RSE row factor, R_i , is the geometric mean of the RSE's in row i . The RSE column factor, C_j , is an adjustment factor with geometric mean equal to 1.0.⁶

⁶For detailed discussions of the accuracy of the RSE approximation, the procedure for estimating confidence intervals, and the statistical tests of hypotheses, see Nonresidential Buildings Energy Consumption Survey: Commercial Buildings, Consumption and Expenditures, 1983, DOE/EIA-0318(83), Washington, D.C., October 1986.

Figure C1. Use of RSE Row and Column Factors

Table 6. Number of Vehicles, Vehicle Miles, Vehicle Fuel Consumption and Expenditures, 1988

Household and Vehicle Characteristics	Number of Vehicles		Vehicle Miles Traveled		Consumption			Expenditures		RSE Row Factor
	(million)	(percent)	(billion)	(percent)	(billion gallons)	(gallon percent)	(quadrillion Btu)	(billion dollars)	(percent)	
RSE Column Factor:	0.967	0.868	1.060	0.960	1.076	0.967	1.075	1.077	0.971	
Household Characteristics										
Total	147.5	100.0	1,511	100.0	82.4	100.0	10,292	81.1	100.0	2.03
Census Region and Division										
Northeast	26.6	18.0	274	18.2	14.0	17.0	1,750	14.2	17.4	4.50
New England	6.6	4.4	67	4.4	3.4	4.1	424	3.5	4.3	11.55
Middle Atlantic	20.1	13.6	208	13.7	10.6	12.9	1,326	10.7	13.2	4.84
Midwest	37.8	25.6	379	25.1	20.8	25.2	2,593	20.4	25.1	3.59
East North Central	26.0	17.6	263	17.4	14.3	17.3	1,787	14.0	17.3	5.34
West North Central	11.8	8.0	115	7.6	6.5	7.9	806	6.3	7.8	6.29
South	50.6	34.3	534	35.3	29.6	35.9	3,701	29.1	35.8	3.28
South Atlantic	25.9	17.6	277	18.3	14.6	17.7	1,827	14.5	17.9	6.07
East South Central	9.4	6.4	98	6.5	5.6	6.8	698	5.4	6.7	9.65
West South Central	15.2	10.3	159	10.5	9.4	11.4	1,176	9.2	11.3	10.13
West	32.5	22.0	325	21.5	18.1	21.9	2,248	17.5	21.6	4.23
Mountain	8.5	5.7	84	5.5	4.7	5.7	587	4.5	5.6	10.71
Pacific	24.0	16.3	241	15.9	13.3	16.2	1,661	13.0	16.0	5.07
Metropolitan Status										
Metropolitan	113.9	77.2	1,171	77.5	62.6	76.0	7,841	61.9	76.3	1.77
Central City	38.7	26.3	376	24.9	20.5	24.8	2,562	20.1	24.8	4.83
Outside Central City	75.2	51.0	794	52.5	42.2	51.2	5,279	41.8	51.6	2.73
Nonmetropolitan	33.6	22.8	341	22.5	19.8	24.0	2,451	19.2	23.7	4.11

Total Vehicle Miles Traveled in the Northeast Census Region = 274 billion miles

R (Northeast Census Region) = 4.50
C (Vehicle Miles Traveled) = 1.060

Approximate RSE (Total Vehicle Miles Traveled in the Northeast Census Region)
= (4.50) • (1.060)
= 4.77 percent

Approximate Standard Error (Total Vehicle Miles Traveled in the Northeast Census Region)
= (.0477) • (274)
= 13 billion miles

Approximate 2 Standard Errors (95 Percent Confidence Interval)
= (1.96) • (13)
= 25 billion miles

Therefore, with 95 percent confidence, the total vehicle miles traveled in the Northeast Census Region in 1988 was between 249 billion and 299 billion miles (274 ± 25)

Source: Energy Information Administration, Office of Energy Markets and End Use, 1988 Residential Transportation Energy Consumption Survey.

Statistics in the tables in the "Detailed Statistics" section are suppressed by the footnote symbol "Q" if (1) the RSE exceeds 50 percent or (2) fewer than 10 sample households were used to compute the statistics. The estimation procedure used to obtain the row and column factors does not use RSE's for statistics that were suppressed by the footnote "Q" or for statistics with RSE's that are less than 1.0 percent. In addition, if the statistic for a cell is not listed for any other reason, the RSE for that cell is not used in the procedure. This convention is used because the product of the row and column factors frequently is an inaccurate estimate for these RSE's.

Using these cells in the calculation of the row and column factors may result in factors that give inaccurate RSE estimates for other cells actually presented in the table.

Whenever a household count is a poststratification control total, its RSE estimate is zero. An example is the cell in the first row and first column of Table 22. This cell contains an estimate of the national total of households as of July 1988 (that is, households with and without vehicles). Because the RSE is zero, this cell was not used in the computation of row and column factors. Zero RSE's are never used in row and column calculations, because their inclusion would make the row and column factors inappropriately low for the bulk of the statistics in the tables. Therefore, RSE's calculated from row and column factors for the total household count in Table 22, or for any other poststratification control total, will be inappropriately overestimated.

Determination of the Standard Error of the Difference Between Two Statistics

The procedure used to compute the standard error of the difference between two statistics follows:

$$SE(x_1 - x_2) = \sqrt{[SE(x_1)]^2 + [SE(x_2)]^2}.$$

This procedure assumes the two statistics are not correlated. The following example illustrates this procedure. Households with children drove an average of 22,519 miles per household in 1988. Households without children drove an average of 16,307 miles, for a difference of 6,212 miles. The RSE's for households with and without children are 2.64 and 2.29, respectively. The corresponding standard errors are 595 miles and 373 miles, respectively. Therefore, the standard error for the difference is:

$$SE(6,212) = \sqrt{[595]^2 + [373]^2} = 702 \text{ miles.}$$

If 1.96 times the standard error is greater than the difference between the statistics, the difference is not statistically significant. In this example, 1.96 times the standard error equals 1,376 miles, while the difference is 6,212 miles. Therefore, the conclusion is that, in 1988, there was a significant difference in average mileage driven per household, between households with and without children.

Survey Forms

[illegible]

Appendix D

Survey Forms

This appendix contains copies of the following data collection forms used in the 1988 Residential Transportation Energy Consumption Survey (Forms EIA-876A-C). Vehicle information collected during the 1987 Residential Energy Consumption Survey are included on pages 36-39 of Form EIA-457B. (See *Housing Characteristics 1987*, Published May 1989, DOE/EIA-0314, for the complete survey form.)

- EIA-457B Household Questionnaire. (Form has blue cover.)
- EIA-876 Vehicle Identification Number Card. (Form is white.)
- EIA-876A Beginning-of-the-Year Questionnaire. (Form has white cover.)
 - Beginning-of-the-Year Odometer Reading Card (Telephone). (Form is yellow.)
 - Beginning-of-the-Year Odometer Reading Card (Mail). (Form is blue.)
- EIA-876B Mid-Year Questionnaire. (Form is white.)
 - Vehicle Update Form. (Form is white.)
 - Vehicle Update Worksheet. (Form is pink.)
- EIA-876C End-of-Year Questionnaire. (Form is white.)
 - End-of-Year Odometer Reading Card (Telephone). (Form is yellow.)
 - End-of-Year Odometer Reading Card (Mail). (Form is blue.)

ASK EVERYONE

Now some questions about cars.

151. How many members of your household can drive a car?

NUMBER OF
DRIVERS:

525-
526

[] NONE

HAND RESPONDENT EXHIBIT 152

152. Do you or other members of your household own or have the regular use of any cars, trucks, vans, or similar vehicles? (DO NOT INCLUDE MOTORCYCLES OR MOPEDS. SEE INSTRUCTION BELOW.)

1 [] YES

527

0 [] NO -- TAKE BACK EXHIBIT 152
AND SKIP TO Q. 165

IF "YES," ASK:

153. How many do you have?

NUMBER OF
VEHICLES:

528-
529

ASK ABOUT EACH VEHICLE.

154. Which type(s) do you have?
(SEE INSTRUCTION BELOW.)

607-608:06

	VEHICLE NUMBER			
	1	2	3	4
STANDARD PASSENGER CAR	01 [] 530-531	01 [] 553-554	01 [] 611-612	01 [] 634-635
2-SEAT CAR	02 []	02 []	02 []	02 []
STATION WAGON	03 []	03 []	03 []	03 []
LARGE VAN	04 []	04 []	04 []	04 []
MINI VAN	05 []	05 []	05 []	05 []
PICKUP TRUCK	06 []	06 []	06 []	06 []
JEEP OR SIMILAR VEHICLE	07 []	07 []	07 []	07 []
OTHER (SPECIFY:)	21 []	21 []	21 []	21 []
TAKE BACK EXHIBIT 152				
155. Please tell me the make and model name (of each one). (SEE INSTRUCTION BELOW.)	532-533	555-556	613-614	636-637
MAKE	534-535	557-558	615-616	638-639
MODEL NAME	536-537	559-560	617-618	640-641
156. What is the model year (of each one)? (ENTER LAST 2 DIGITS OF MODEL YEAR)	MODEL YEAR 19	MODEL YEAR 19	MODEL YEAR 19	MODEL YEAR 19

INTERVIEWER INSTRUCTIONS:

Q. 152 -- "Regular use" means keeping the vehicle at home.

Q. 154 -- If household has more than four vehicles, mark answers for the four vehicles used most.

Q. 155 -- A model name may consist of several parts -- be sure to get the complete model name. Here are some examples, where the complete model name is in parentheses: Ford (Galaxie), Chevrolet (V10 Suburban), GMC (V15 Jimmy), Toyota (2WD Cargo Van). If respondent does not know the model name of a truck, probe for size (1/2 ton, 3/4 ton, etc.)

CONTINUE IF ONE OR MORE VEHICLES ON Q. 153; OTHERWISE SKIP TO Q. 165

ASK Q's. 157-164 FIRST ABOUT FIRST VEHICLE, THEN SECOND VEHICLE, THIRD, AND FOURTH; REPEAT MAKE AND MODEL OF EACH VEHICLE.

USE COLUMNS FOR VEHICLE NUMBERS CORRESPONDING TO THOSE ON PRECEDING PAGE

These next questions are about your (MAKE & MODEL 1/ MAKE & MODEL 2/ MAKE & MODEL 3/ MAKE & MODEL 4.)

157. Did you get this vehicle within the past 12 months or did you have it before that?

WITHIN PAST 12 MONTHS
ASK Q. 158

HAD IT MORE THAN 12 MONTHS
SKIP TO Q. 160

IF "WITHIN PAST 12 MONTHS," ASK:

158. In what month and year did you get it?

MONTH

YEAR

159. Approximately how many miles has it been driven since you have had it?

MILES

DON'T KNOW

IF "HAD IT MORE THAN 12 MONTHS" ON Q. 157, ASK:

160. Approximately how many miles was it driven during the past 12 months?

MILES

DON'T KNOW

161. I would like to obtain the odometer reading and Vehicle Identification Number for this vehicle -- directly from the vehicle. Is the vehicle available right now so that we may get this information?

YES

CHECK HERE AND ASK Q. 164

NO

GO TO NEXT PAGE AND ASK Q's 162-163

VEHICLE NUMBER			
1	2	3	4
538	561	619	642
1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>
2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>
539-542	562-565	620-623	643-646
198	198	198	198
543-547	566-570	624-628	647-651
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
548-552	571-575	629-633	652-656
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

INSPECT EACH VEHICLE MARKED "YES" ON Q. 161 AFTER YOU COMPLETE HOUSE MEASUREMENTS IN Q's 180-184.

IF "NO" ON Q. 161 (THIS CAR IS NOT AVAILABLE) ASK Q. 162. IF "YES" ON Q. 161, ASK Q. 157 FOR NEXT VEHICLE; IF NO OTHER VEHICLES, SKIP TO Q. 165.

162. Do you know approximately what the odometer reading is for this vehicle?

HAND RESPONDENT EXHIBIT 163.

163. I would still like to record the Vehicle Identification Number for this vehicle. Do you know what a Vehicle Identification Number is? (IF DON'T KNOW, EXPLAIN VIN.) What is the Vehicle Identification Number for this vehicle? (SEE INSTRUCTIONS BELOW.)

INTERVIEWER: REPORT HERE IF VIN REFUSED FOR ONE OR MORE VEHICLES.
EXPLAIN RESPONDENT REACTION OR REASON FOR REFUSING VIN.

V	1	Make _____ Model _____	
		[] ₁ ODOMETER KNOWN _____ (ESTIMATED ODOMETER READING) _____	1353-1358
		[] ₀ ODOMETER NOT KNOWN	
E		VIN: _____	
		[] ₁ VIN OBTAINED [] ₈ VIN NOT OBTAINED [] ₇ VIN REFUSED	1378 1380
I	2	Make _____ Model _____	
		[] ₁ ODOMETER KNOWN _____ (ESTIMATED ODOMETER READING) _____	1411-1416
		[] ₀ ODOMETER NOT KNOWN	
C		VIN: _____	
		[] ₁ VIN OBTAINED [] ₈ VIN NOT OBTAINED [] ₇ VIN REFUSED	1436 1438
N	3	Make _____ Model _____	
		[] ₁ ODOMETER KNOWN _____ (ESTIMATED ODOMETER READING) _____	1440-1445
		[] ₀ ODOMETER NOT KNOWN	
U		VIN: _____	
		[] ₁ VIN OBTAINED [] ₈ VIN NOT OBTAINED [] ₇ VIN REFUSED	1465 1467
B	4	Make _____ Model _____	
		[] ₁ ODOMETER KNOWN _____ (ESTIMATED ODOMETER READING) _____	1618-1623
		[] ₀ ODOMETER NOT KNOWN	
E		VIN: _____	
		[] ₁ VIN OBTAINED [] ₈ VIN NOT OBTAINED [] ₇ VIN REFUSED	1643 1645

INTERVIEWER INSTRUCTIONS:

Q. 163 -- Explain what the VIN is if respondent does not know.

If respondent questions need for VIN, say:

"The VIN is a set of codes assigned to a vehicle at the factory that, when decoded, describes several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle."

Review the exhibit card of possible VIN locations. Record the VIN and verify for correctness.

RECORD VEHICLE INSPECTION(S) BELOW.

IF "YES" ON Q. 161, SKIP THIS PAGE (Q. 164) FOR NOW. ASK Q. 157 FOR NEXT VEHICLE (IF NO OTHER VEHICLES, SKIP TO Q. 165).
AFTER COMPLETING Qs. 165-179 AND THE MEASUREMENT PROCEDURE IN Qs. 180-184, INSPECT ALL VEHICLES MARKED "YES" ON Q. 161. RECORD VEHICLE INSPECTION(S) BELOW.

164. (SEE INSTRUCTIONS BELOW.)

V E H I C L E	1	Make _____ Model _____	
		<input type="checkbox"/> ODOMETER OBTAINED _____ 2 1360 (ODOMETER READING FROM VEHICLE) 1353-1358	
		<input type="checkbox"/> ODOMETER NOT OBTAINED	
		<input type="checkbox"/> ODOMETER REFUSED	
VIN: _____			
		<input type="checkbox"/> 1362 VIN OBTAINED <input type="checkbox"/> 8 VIN NOT OBTAINED <input type="checkbox"/> 7 VIN REFUSED	1378 1380
I C L E	2	Make _____ Model _____	
		<input type="checkbox"/> ODOMETER OBTAINED _____ 2 1418 (ODOMETER READING FROM VEHICLE) 1411-1416	
		<input type="checkbox"/> ODOMETER NOT OBTAINED	
		<input type="checkbox"/> ODOMETER REFUSED	
VIN: _____			
		<input type="checkbox"/> 1420 VIN OBTAINED <input type="checkbox"/> 8 VIN NOT OBTAINED <input type="checkbox"/> 7 VIN REFUSED	1436 1438
N U M B E R	3	Make _____ Model _____	
		<input type="checkbox"/> ODOMETER OBTAINED _____ 2 1447 (ODOMETER READING FROM VEHICLE) 1440-1445	
		<input type="checkbox"/> ODOMETER NOT OBTAINED	
		<input type="checkbox"/> ODOMETER REFUSED	
VIN: _____			
		<input type="checkbox"/> 1449 VIN OBTAINED <input type="checkbox"/> 8 VIN NOT OBTAINED <input type="checkbox"/> 7 VIN REFUSED	1465 1467
R	4	Make _____ Model _____	
		<input type="checkbox"/> ODOMETER OBTAINED _____ 2 1625 (ODOMETER READING FROM VEHICLE) 1618-1623	
		<input type="checkbox"/> ODOMETER NOT OBTAINED	
		<input type="checkbox"/> ODOMETER REFUSED	
VIN: _____			
		<input type="checkbox"/> 1627 VIN OBTAINED <input type="checkbox"/> 8 VIN NOT OBTAINED <input type="checkbox"/> 7 VIN REFUSED	1643 1645

INTERVIEWER: REPORT HERE
IF VIN REFUSED FOR ONE OR
MORE VEHICLES.
EXPLAIN RESPONDENT
REACTION OR REASON FOR
REFUSING VIN.

INTERVIEWER INSTRUCTIONS:

Q. 164 -- If respondent questions need for VIN, say:

"The VIN is a set of codes assigned to a vehicle at the factory that, when decoded, describes several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle."

Record VIN from the vehicle itself whenever possible. If VIN cannot be found on the vehicle, show Exhibit 163 (VIN LOCATIONS CARD), and attempt to secure VIN from one of these document sources.

1988 Residential Transportation Energy Consumption Survey
Vehicle Identification Number Card

Form Approval:
OMB No.: 1905-0068
Expires: 9/30/90



U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION

THIS CARD IS FOR YOUR:

In order for us to estimate the fuel efficiency of this vehicle, it would be helpful to know the Vehicle Identification Number (VIN). The VIN provides information that allows researchers to estimate fuel economy for all types of cars, trucks and other vehicles. In this survey, your vehicles will represent those from thousands of other households that have similar vehicles. The VIN is a set of codes assigned to a vehicle at the factory which, when decoded, describe several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle.

No information linking your name and address with the data you provide will be given to the Department of Energy, or any other government agency. Data provided to the Department of Energy will be screened to protect the identity of individual households.

PLEASE SEE THE OTHER SIDE OF THIS CARD FOR ADDITIONAL INSTRUCTIONS ON WHERE TO FIND THE VEHICLE IDENTIFICATION NUMBER.

For the vehicle described at the top of this card, please carefully record its Vehicle Identification Number below:

VIN: _____

Check here if you cannot find the Vehicle Identification Number ☐.

After you have filled out the information requested, please keep this card near your telephone. We will be calling you to get the information. If you will be difficult to reach by phone, or if you have any questions about this survey, call collect to Jim Devlin at (609) 921-3333.

EIA-876
(9/87)

THANK YOU FOR YOUR HELP

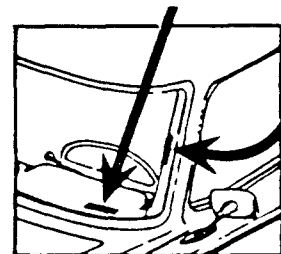
PLEASE READ THE OTHER SIDE OF THIS CARD FIRST
ADDITIONAL INSTRUCTIONS ON WHERE TO FIND THE VEHICLE IDENTIFICATION NUMBER

The Vehicle Identification Number (VIN) is a combination of digits and letters. It is usually 17 letters and digits long. Here is an example of what the VIN may look like:

1FABP28A6FF143890

The Vehicle Identification Number may be found in a number of places:

- On the vehicle.
Look for a small metal label that can be read while standing outside the vehicle. Look for the label on the driver's side of the dashboard, or on the window post. Sometimes it is on the driver's door.
- On the motor vehicle registration certificate.
- On an insurance card or insurance policy for the vehicle.
- On the vehicle title.
- On a State safety or emissions inspection certificate.
- On the bill of sale for the vehicle.



Caution . . . The Vehicle Identification Number is usually **not** found on your driver's license or on the vehicle license plates.

Once you have located the Vehicle Identification Number, copy it down on the VEHICLE IDENTIFICATION NUMBER CARD exactly as it appears on the vehicle, or on the document you are using.

For the sample VIN given above, we would write:

VIN: 1 F A B P 2 8 A 6 F F 1 4 3 8 9 0

We have sent you one VEHICLE IDENTIFICATION NUMBER CARD preprinted for each vehicle in the household — except for vehicles whose Identification Numbers you have already provided to us.

In addition, one extra VEHICLE IDENTIFICATION NUMBER CARD was sent to you. If your household now owns or regularly uses a vehicle that we did not send a VIN CARD for, please use the extra card for this vehicle, and fill in the TYPE, YEAR, MAKE and MODEL NAME on the card label.

1988 RESIDENTIAL TRANSPORTATION ENERGY CONSUMPTION SURVEY
BEGINNING-OF-YEAR QUESTIONNAIRE
(TELEPHONE SURVEY)

CALL RECORD				C O M P L E T E	B U S Y S I G N A L	N O A N S W E R	N O T A V A I L A B L E	R E F U S A L	R E S P O N D E N T N O T R E A D Y	M A I L N E W C A R D S	O T H E R	I N T E R - V I E W E R	C A L L B A C K A T ...
DAY OF WEEK	DATE	TIME											
1				C	B	NA	X	R	NR	MC	O		
2				C	B	NA	X	R	NR	MC	O		
3				C	B	NA	X	R	NR	MC	O		
4				C	B	NA	X	R	NR	MC	O		
5				C	B	NA	X	R	NR	MC	O		
6				C	B	NA	X	R	NR	MC	O		
7				C	B	NA	X	R	NR	MC	O		
8				C	B	NA	X	R	NR	MC	O		

Notes below on: ☐ CONTACT PERSON ☐ BEST TIME FOR CONTACT ☐ MOVING ☐ "OTHER"

Hello, this is _____. I'm calling from Response Analysis, a survey research firm. My call concerns the Department of Energy survey. May I speak to _____?

ASK FIRST TO SPEAK WITH THE PERSON WHOSE NAME APPEARS ON THE LABEL. IF HE/SHE IS UNAVAILABLE, THE INTERVIEW MAY BE COMPLETED WITH A SPOUSE OR OTHER KNOWLEDGEABLE MEMBER OF THE HOUSEHOLD.

IF AN ALTERNATE RESPONDENT IS USED, CHECK "CONTACT PERSON" ABOVE AND RECORD THE NAME.

We contacted you within the last month about the study we are conducting for the Department of Energy about the use of gasoline and diesel fuel for household vehicles. The purpose of this call is to obtain some additional information about your vehicles and their use. Your participation is very important to the success of the research and is voluntary. Is this a convenient time to ask you some questions?

IF ASKED ABOUT CONFIDENTIALITY, READ:

This survey is voluntary and authorized under the Federal Energy Administration Act of 1974 (Public Law 93-275), as amended. Information about specific households will be kept strictly confidential. The data will be screened to protect the identity of individual households, and summarized within large groupings for statistical purposes.

INTERVIEWER NAME: _____ ID NO: _____

EIA-876A
(9/87)

- A1. First, I would like to check that we have your correct mailing address.
Is it . . . (READ ADDRESS SHOWN ON LABEL) . . . ?

[] YES

[] NO ---->

A1.A IF ADDRESS IS INCORRECT, NOTE CORRECT ADDRESS BELOW.

Street Address: _____

City, State: _____ ZIP: _____

A1.B When did you move to (ADDRESS NOTED ABOVE)?

Month and year: _____

- A2. Within the last couple of weeks, we mailed you some cards for recording the total mileage or odometer reading(s) for your vehicle(s) -- and also for recording the Vehicle Identification Number(s). Have you filled out these cards yet?

[] YES: CARDS ARE FILLED OUT. ASK:

Can you get them right now?

YES. AFTER RESPONDENT GETS COMPLETED CARD(S), BEGIN WITH THE FOLLOWING INTRODUCTION:

"I have a description of the vehicle(s) mentioned at the time of our most recent contact with your household -- I would like to verify this(these) description(s) with you."

NOW, SKIP TO QUESTION A3. ----->

NO. IF RESPONDENT CANNOT GET CARD(S) WHILE YOU WAIT, ARRANGE DATE AND TIME TO CALL BACK. MARK "NR" ON CALL RECORD.

[] NO: CARDS ARE NOT FILLED OUT YET, BUT WILL FILL OUT.
ARRANGE A DATE AND TIME TO CALL BACK AFTER CARDS ARE COMPLETED.
MARK "NR" ON CALL RECORD.

[] NO: CARDS ARE LOST. MAIL NEW CARDS. MARK "MC" ON CALL RECORD.

[] NO: HOUSEHOLD NO LONGER HAS ANY VEHICLES DESCRIBED ON CARDS.
READ THE FOLLOWING INTRODUCTION:

"From our most recent contact, I have a description of the vehicle(s) which you no longer have. For the record, I would like to briefly verify some information about that (those) vehicle(s)."

NOW SKIP TO QUESTION A3. ----->

INTERVIEWER INSTRUCTIONS IF VIN EXPLANATION IS NEEDED:

The VIN provides information that allows researchers to estimate fuel economy for all types of cars, trucks and other vehicles. In this survey, your vehicles will represent those from thousands of other households that have similar vehicles.

The VIN is a set of codes assigned to a vehicle at the factory which, when decoded, describe several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle.

Your VIN, and all other information that you provide, will be held confidential. No information that can be linked to your name and address will ever be provided to the Department of Energy, or to any other government agency.

TIME BEGAN Q.A3. _____

A3. Do you still have:
(DESCRIBE VEHICLE AS LISTED ON
COMPUTER FOLD-OUT PAGE, EXPECT FOR VIN)?

YES
CONTINUE WITH Q.A4
NO
SKIP TO Q.B1
(BLUE PAGE)
NEVER HAD

VEHICLE NUMBER			
1	2	3	4
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
8 []	8 []	8 []	8 []
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
MILES			
[]	[]	[]	[]
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
6 []	6 []	6 []	6 []
MONTH			
_____	_____	_____	_____
DAY			
_____	_____	_____	_____
DON'T KNOW			
[]	[]	[]	[]

IF "YES" FOR Q.A3.. ASK:

A4. Have I described it correctly?
(IF NO, CORRECT COMPUTER FOLD-OUT.
ALSO TRY TO OBTAIN MISSING YEAR,
MAKE OR MODEL.)

YES
NO

A5. What was the odometer reading (total)
mileage) that you recorded on the
Odometer Card that we sent you?
(READ BACK TO VERIFY)

MILES
DON'T KNOW

A6. Was the mileage recorded on
(DATE SPECIFIED ON COMPETER
FOLD-OUT)?

YES
NO
DON'T KNOW

IF "NO" FOR Q.A6.. ASK:

A7. On what date was it recorded?

MONTH
DAY
DON'T KNOW

IF VIN ABSENT FROM COMPUTER FOLD-OUT ASK:

A8. What is the Vehicle Identification Number?
(HAVE RESPONDENT READ THIS FROM THE VIN CARD FOR THAT VEHICLE. READ BACK TO VERIFY. SEE INSTRUCTION
BELOW.)

VEHICLE NUMBER	1	2	3	4
VEHICLE NUMBER	VIN: _____	VIN: _____	VIN: _____	VIN: _____
	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []
	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []
	VIN: _____	VIN: _____	VIN: _____	VIN: _____
VEHICLE NUMBER	VIN: _____	VIN: _____	VIN: _____	VIN: _____
	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []
	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []
	VIN: _____	VIN: _____	VIN: _____	VIN: _____
VEHICLE NUMBER	VIN: _____	VIN: _____	VIN: _____	VIN: _____
	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []
	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []
	VIN: _____	VIN: _____	VIN: _____	VIN: _____
VEHICLE NUMBER	VIN: _____	VIN: _____	VIN: _____	VIN: _____
	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []	VIN NOT OBTAINED []
	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []	VIN REFUSED []
	VIN: _____	VIN: _____	VIN: _____	VIN: _____

INTERVIEWER: Describe respondent reason or reaction for refusing VIN.

INTERVIEWER INSTRUCTIONS IF VIN EXPLANATION IS NEEDED:

The VIN provides information that allows researchers to estimate fuel economy for all types of cars, trucks and other vehicles. In this survey, your vehicles will represent those from thousands of other households that have similar vehicles.

The VIN is a set of codes assigned to a vehicle at the factory which, when decoded, describe several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle.

Your VIN, and all other information that you provide, will be held confidential. No information that can be linked to your name and address will ever be provided to the Department of Energy, or to any other government agency.

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(9/87)

INTERVIEWER: Remind respondent which vehicle you are discussing -- e.g., Ford LTD, Dodge pickup, etc.

		VEHICLE NUMBER			
		1	2	3	4
A9. Does it have an automatic transmission or a manual shift?	AUTOMATIC	1 []	1 []	1 []	1 []
	MANUAL SHIFT	2 []	2 []	2 []	2 []
	DON'T KNOW	6 []	6 []	6 []	6 []
A10. How many cylinders does the engine have?	2-CYLINDER	2 []	2 []	2 []	2 []
	4-CYLINDER	4 []	4 []	4 []	4 []
	5-CYLINDER	5 []	5 []	5 []	5 []
	6-CYLINDER	6 []	6 []	6 []	6 []
	8-CYLINDER	8 []	8 []	8 []	8 []
	OTHER (SPECIFY)	21 []	21 []	21 []	21 []
	DON'T KNOW	96 []	96 []	96 []	96 []
A11. Does it have front-wheel, rear-wheel or 4-wheel drive? (CHECK ALL THAT APPLY.)	FRONT WHEEL	1 []	1 []	1 []	1 []
	REAR-WHEEL	2 []	2 []	2 []	2 []
	4-WHEEL	3 []	3 []	3 []	3 []
	OTHER (SPECIFY)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
A12. Does the fuel system use a carburetor, fuel injection, or is it a diesel engine?	CARBURETOR	1 []	1 []	1 []	1 []
	FUEL INJECTION	2 []	2 []	2 []	2 []
	DIESEL	3 []	3 []	3 []	3 []
	OTHER (SPECIFY)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
A13. What is the engine size in liters or cubic inches? For example, engine sizes can range from 1 liter to 6.2 liters.	LITERS				
	CUBIC INCHES				
	OTHER (SPECIFY)	995 []	995 []	995 []	995 []
	DON'T KNOW	996 []	996 []	996 []	996 []
A14. Is this vehicle used on the job by anyone in your household, not counting going to and from work?	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []
	DON'T KNOW	6 []	6 []	6 []	6 []

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A15. Does this vehicle use gasoline or diesel fuel?

GASOLINE
DIESEL FUEL
OTHER (SPECIFY)

DON'T KNOW

IF "GASOLINE" FOR Q.A15., ASK:

A16. During the past year, did you use mostly leaded or unleaded gasoline in this vehicle?

LEADED
UNLEADED
OTHER (SPECIFY)

DON'T KNOW

IF "UNLEADED" FOR Q.A16., ASK:

A17. During the past year, did you use mostly regular or premium gasoline in this vehicle -- or some grade in-between regular and premium?

REGULAR
PREMIUM
INTERMEDIATE
OTHER (SPECIFY)

DON'T KNOW

A18. When you bought fuel for this vehicle during the past year, did you use full-service pumps or self-service pumps for most purchases? (RECORD MINI-SERVE AS SELF-SERVICE)

FULL-SERVICE
SELF-SERVICE
(INCLUDES MINI-SERVE)
BOTH EQUALLY
OTHER (SPECIFY)

DON'T KNOW

VEHICLE NUMBER			
1	2	3	4
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
3 []	3 []	3 []	3 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
3 []	3 []	3 []	3 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []

■ FOR NEXT VEHICLE ON COMPUTER FOLD-OUT PAGE, GO BACK TO QUESTION A3.

■ AFTER LAST VEHICLE ON COMPUTER FOLD-OUT PAGE, SKIP TO EITHER QUESTION C1 OR C3 ON THE GREEN PAGES:

SKIP TO QUESTION C1 -- IF HOUSEHOLD STILL HAS 1 OR MORE VEHICLES ON THE COMPUTER FOLD-OUT PAGE.

SKIP TO QUESTION C3 -- IF HOUSEHOLD DOES NOT NOW HAVE ANY OF THE VEHICLES ON THE COMPUTER FOLD-OUT PAGE.

B1. Was this vehicle sold, traded in or disposed of, or did the owner move away?

SOLD, TRADED
OR DISPOSED OF
OWNER MOVED AWAY
DON'T KNOW

VEHICLE NUMBER			
1	2	3	4
1 []	1 []	1 []	1 []
2 []	2 []	2 []	1 []
6 []	6 []	6 []	6 []
_____	_____	_____	_____
_____	_____	_____	_____
96 []	96 []	96 []	96 []
96 []	96 []	96 []	96 []
_____	_____	_____	_____
[]	[]	[]	[]
_____	_____	_____	_____
_____	_____	_____	_____
96 []	96 []	96 []	96 []
96 []	96 []	96 []	96 []

IF "OWNER MOVED AWAY" FOR
Q.B1., ASK:

B4. In what month and year did the owner move away with this vehicle?

MONTH
YEAR
DON'T KNOW MONTH
DON'T KNOW YEAR

- FOR NEXT VEHICLE ON COMPUTER FOLD-OUT PAGE, GO BACK TO QUESTION A3.
- AFTER LAST VEHICLE ON COMPUTER FOLD-OUT PAGE, SKIP TO EITHER QUESTION C1 OR C3 ON THE GREEN PAGES:
 - SKIP TO QUESTION C1 -- IF HOUSEHOLD STILL HAS 1 OR MORE VEHICLES ON THE COMPUTER FOLD-OUT PAGE.
 - SKIP TO QUESTION C3 -- IF HOUSEHOLD DOES NOT NOW HAVE ANY OF THE VEHICLES ON THE COMPUTER FOLD-OUT PAGE.

IF HOUSEHOLD STILL HAS ONE OR MORE VEHICLES ON COMPUTER FOLD-OUT PAGE.

- C1. Do you or other members of your household own or have for your regular personal use any cars, trucks, vans or similar vehicles, in addition to (DESCRIBE VEHICLES LISTED ON COMPUTER FOLD-OUT PAGE, EXCEPT FOR VIN)?
- 1 [] YES
0 [] NO
6 [] DON'T KNOW
- SKIP TO Q. D1. (YELLOW PAGE)

IF "YES", ASK:

- C2. How many additional vehicles do you have?
- 1 [] ONE
2 [] TWO
3 [] THREE
4 [] FOUR OR MORE
6 [] DON'T KNOW
- ASK Q. C5.

IF HOUSEHOLD NO LONGER HAS ANY VEHICLES ON COMPUTER FOLD-OUT PAGE.

- C3. Do you or other members of your household now own or have the regular use of any cars, trucks, vans or similar vehicles?
- 1 [] YES
0 [] NO
6 [] DON'T KNOW
- SKIP TO Q. D1. (YELLOW PAGE)

IF "YES", ASK:

- C4. How many vehicles do you have?
- 1 [] ONE
2 [] TWO
3 [] THREE
4 [] FOUR OR MORE
6 [] DON'T KNOW
- ASK Q. C5.

IF "ONE OR MORE VEHICLES" ON Q.C2 OR C4, ASK Q C5 FOR EACH VEHICLE. AND THEN CONTINUE WITH Q.C6.

- C5. Please tell me the make, model name and year (of each one). (SEE INSTRUCTION BELOW)

MAKE
MODEL NAME
MODEL YEAR
DON'T KNOW MAKE
DON'T KNOW MODEL
DON'T KNOW YEAR

	A	B	C	D
MAKE				
MODEL NAME				
MODEL YEAR	19	19	19	19
DON'T KNOW MAKE	[]	[]	[]	[]
DON'T KNOW MODEL	[]	[]	[]	[]
DON'T KNOW YEAR	[]	[]	[]	[]
C6. What type of vehicle is the (READ: YEAR, MAKE, MODEL -- FROM Q.C5.) (READ CATEGORIES TO RESPONDENT IF NECESSARY.)				
STANDARD PASSENGER CAR	1 []	1 []	1 []	1 []
2-SEAT CAR	2 []	2 []	2 []	2 []
STATION WAGON	3 []	3 []	3 []	3 []
LARGE VAN	4 []	4 []	4 []	4 []
MINI VAN	5 []	5 []	5 []	5 []
PICKUP TRUCK	6 []	6 []	6 []	6 []
JEEP OR SIMILAR	7 []	7 []	7 []	7 []
OTHER (SPECIFY)	21 []	21 []	21 []	21 []
DON'T KNOW	96 []	96 []	96 []	96 []

INTERVIEWER INSTRUCTIONS:

Q.C5 -- A model name may consist of several parts -- be sure to get the complete model name. Here are some examples, where the complete model name is in parentheses: Ford (Galaxie), Chevrolet (V10 Suburban), GMC (V15 Jimmy), Toyota (2WD Cargo Van). If respondent does not know the name of a truck, probe for size (1/2 ton, 3/4 ton, etc.)

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		A	B	C	D
C7. In what month and year did you get this vehicle?	MONTH	_____	_____	_____	_____
	YEAR	19 _____	19 _____	19 _____	19 _____
	DON'T KNOW MONTH	96 []	96 []	96 []	96 []
	DON'T KNOW YEAR	96 []	96 []	96 []	96 []
C8. Do you happen to now the total mileage (odometer) reading after the last use of the vehicle on (DATE FROM COMPUTER FOLD-OUT)?	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []
IF "YES", ASK:					
C9. What was the mileage as of (DATE FROM COMPUTER FOLD-OUT)?	MILES	_____	_____	_____	_____
IF "NO", ASK:					
C10. Do you know the mileage as of a different date?	NO	0 []	0 []	0 []	0 []
	YES	1 []	1 []	1 []	1 []
	DATE	_____	_____	_____	_____
	MILES	_____	_____	_____	_____
C11. Do you know the Vehicle Identification Number for this vehicle? (SEE INSTRUCTION BELOW)	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []

IF "YES", ASK:

C12. What is the Vehicle Identification Number for this vehicle? (VERIFY WITH RESPONDENT)

VEHICLE NUMBER	A	VIN: _____	_____	_____	_____
		VIN NOT OBTAINED []	VIN REFUSED []		
	B	VIN: _____	_____	_____	_____
		VIN NOT OBTAINED []	VIN REFUSED []		
C	VIN: _____	_____	_____	_____	
	VIN NOT OBTAINED []	VIN REFUSED []			
D	VIN: _____	_____	_____	_____	
	VIN NOT OBTAINED []	VIN REFUSED []			

INTERVIEWER; Describe respondent reason for refusing VIN.

INTERVIEWER INSTRUCTIONS IF VIN EXPLANATION IS NEEDED:

The VIN provides information that allows researchers to estimate fuel economy for all types of cars, trucks and other vehicles. In this survey, your vehicles will represent those from thousands of other households that have similar vehicles.

The VIN is a set of codes assigned to a vehicle at the factory which, when decoded, describe several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle.

Your VIN and all other information that you provide, will be held confidential. No information that can be linked to your name and address will ever be provided to the Department of Energy, or to any other government agency.

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INTERVIEWER: Remind respondent which vehicle you are discussing -- e.g., Ford LTD, Dodge pickup, etc.

		A	B	C	D
C13. Does it have an automatic transmission or a manual shift?	AUTOMATIC	1 []	1 []	1 []	1 []
	MANUAL SHIFT	2 []	2 []	2 []	2 []
	DON'T KNOW	6 []	6 []	6 []	6 []
C14. How many cylinders does the engine have?	2-CYLINDER	2 []	2 []	2 []	2 []
	4-CYLINDER	4 []	4 []	4 []	4 []
	5-CYLINDER	5 []	5 []	5 []	5 []
	6-CYLINDER	6 []	6 []	6 []	6 []
	8-CYLINDER	8 []	8 []	8 []	8 []
	OTHER (SPECIFY)	21 []	21 []	21 []	21 []
	DON'T KNOW	96 []	96 []	96 []	96 []
C15. Does it have front-wheel, rear-wheel or 4-wheel drive? (CHECK ALL THAT APPLY.)	FRONT WHEEL	1 []	1 []	1 []	1 []
	REAR-WHEEL	2 []	2 []	2 []	2 []
	4-WHEEL	3 []	3 []	3 []	3 []
	OTHER (SPECIFY)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
C16. Does the fuel system use a carburetor, fuel injection, or is it a diesel engine?	CARBURETOR	1 []	1 []	1 []	1 []
	FUEL INJECTION	2 []	2 []	2 []	2 []
	DIESEL	3 []	3 []	3 []	3 []
	OTHER (SPECIFY)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
C17. What is the engine size in liters or cubic inches? For example, engine sizes can range from 1 liter to 6.2 liters.	LITERS	_____	_____	_____	_____
	CUBIC INCHES	_____	_____	_____	_____
	OTHER (SPECIFY)	995 []	995 []	995 []	995 []
	DON'T KNOW	996 []	996 []	996 []	996 []
C18. Is this vehicle used on the job by anyone in your household, not counting going to and from work?	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []
	DON'T KNOW	6 []	6 []	6 []	6 []

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(9/87)

C19. Does this vehicle use gasoline or diesel fuel?

GASOLINE
DIESEL FUEL
OTHER (SPECIFY)

DON'T KNOW

IF "GASOLINE" FOR Q.C19., ASK:

C20. Do you generally use leaded or unleaded gasoline in this vehicle?

LEADED
UNLEADED
OTHER (SPECIFY)

DON'T KNOW

IF "UNLEADED" FOR Q.C20., ASK:

C21. Do you generally use regular or premium gasoline in this vehicle -- or some grade in-between regular and premium?

REGULAR
PREMIUM
INTERMEDIATE
OTHER (SPECIFY)

DON'T KNOW

C22. When you buy fuel for this vehicle, do you use full-service pumps or self-service pumps for most purchases? (RECORD MINI-SERVICE AS SELF SERVICE)

FULL-SERVICE
SELF-SERVICE
(INCLUDES MINI-SERVE)
BOTH EQUALLY
OTHER (SPECIFY)

DON'T KNOW

A	B	C	D
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
3 []	3 []	3 []	3 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
3 []	3 []	3 []	3 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []

CONTINUE WITH QUESTION D1. (YELLOW PAGE.)

ASK EVERYONE

D1. Is there a possibility that your household
will move any time within the next 12 months?

1 [] YES, DEFINITELY

2 [] POSSIBLY

0 [] NO -- SKIP TO Q. D4.

IF "YES" OR "POSSIBLY", ASK:

D2. Do you happen to know when you
(are/might be) moving?

MONTH/DAY/YEAR _____

APPROXIMATE TIME PERIOD _____

[] DON'T KNOW

D3. Do you happen to know what your new
address will be?

NAME: _____

STREET: _____

CITY/STATE: _____ ZIP: _____

PHONE: _____
(Area Code)

D4. Thank you very much.

We will be contacting you at the end of the year to obtain followup odometer reading(s) for your
vehicle(s).

Have a nice day/evening.

(Interviewer) (Date Completed) (Time Completed) AM
PM

INTERVIEWER NOTES: _____

EIA-876A
(9/87)

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**1988 Residential Transportation Energy Consumption Survey
Beginning-of-Year Odometer Reading Card**

Form Approval
OMB No. 1905-0068
Expires: 9/30/90



THIS CARD IS FOR YOUR:

**U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION**

Please put this card in your vehicle and write down the total
mileage (odometer reading) after the last use of this vehicle
on **FRIDAY, JANUARY 8, 1988**

MILES

After you have filled in the information requested, please keep this card near your telephone. We will be calling you to get the information. Or, if you will be difficult to reach by phone, call collect to Jim Devlin at (609) 921-3333.

Please see the other side of this card for additional instructions.

THANKS FOR YOUR HELP!

EIA-876A
(9/87)

PLEASE READ THE OTHER SIDE OF THIS CARD FIRST

Additional instructions:

If your mileage meter (odometer) registers tenths of miles, please ignore these and record whole number of miles only.

If vehicle is not used on the day and date given on the other side of this card, please record the total mileage (odometer reading) as of that day.

If the mileage meter (odometer) does not work, just let us know that.

One extra Odometer Reading Card was sent to you.

If your household now owns or regularly uses any **replacement or additional vehicle** that we didn't send an Odometer Reading Card for, use the extra card for that vehicle, and fill in the **TYPE, YEAR, MAKE and MODEL NAME** on the card label.

**1988 Residential Transportation Energy Consumption Survey
Beginning-of-Year Odometer Reading Card**

Form Approval:
OMB No. 1905-0068
Expires: 9/30/90



U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION

THIS CARD IS FOR YOUR:

Please put this card in your vehicle and write down the total
mileage (odometer reading) after the last use of this vehicle
on **FRIDAY, JANUARY 8, 1988**.....

MILES

After you have filled out the information requested, please return the card to the U.S. Department of Energy, Box 7335,
Princeton, NJ 08543-9967, using the self-addressed Business Reply envelope.

Please see the other side of this card for additional instructions.

THANKS FOR YOUR HELP!

EIA-876A
(9/87)

PLEASE READ THE OTHER SIDE OF THIS CARD FIRST

Additional instructions:

If your mileage meter (odometer) registers tenths of miles, please ignore these and record whole number of miles only.

If vehicle is not used on the day and date given on the other side of this card, please record the total mileage (odometer reading) as of that day.

If the mileage meter (odometer) does not work, just let us know that.

One extra Odometer Reading Card was sent to you.

If your household now owns or regularly uses any replacement or additional vehicle that we didn't send an Odometer Reading Card for, use the extra card for that vehicle, and fill in the TYPE, YEAR, MAKE and MODEL NAME on the card label.

1988 RESIDENTIAL TRANSPORTATION ENERGY CONSUMPTION SURVEY
MID-YEAR QUESTIONNAIRE
(TELEPHONE SURVEY)

FORM APPROVAL:
OMB No. 1905-0068
EXPIRES: 9/30/90

101-104

106-109

105

CALL #	CALL RECORD			CALL RESULT CODE									INTERVIEWER	NOTES, INCLUDING: o Contact person o Best time for callback o Appointments o REFUSALS* (REMEMBER TO RECORD E.S.T. FOR ALL TIMES RECORDED.)
	DAY OF WEEK	DATE	TIME	B U S Y	A M	N A	R A	L A B	D I S	O T H E R	R* E F	C M		
1				1	2	3	4	5	6	7	8*	9		
2				1	2	3	4	5	6	7	8*	9		
3				1	2	3	4	5	6	7	8*	9		
4				1	2	3	4	5	6	7	8*	9		
5				1	2	3	4	5	6	7	8*	9		
6				1	2	3	4	5	6	7	8*	9		
7				1	2	3	4	5	6	7	8*	9		
8				1	2	3	4	5	6	7	8*	9		

***IMPORTANT:** ALL REFUSALS SHOULD BE 1) SPECIFIED AS "HARD" OR "SOFT," AND
2) DESCRIBED (WRITE REASONS AND STATEMENT.)

ASK FIRST TO SPEAK WITH THE PERSON WHOSE NAME APPEARS ON THE LABEL. IF HE/SHE IS UNAVAILABLE, THE INTERVIEW MAY BE COMPLETED WITH HUSBAND OR WIFE.

Hello, this is _____ calling from Response Analysis Corporation in Princeton, New Jersey. We recently sent you a letter about a special study that the U.S. Department of Energy has asked us to do on household energy use.

A1. First I would like to check that we have your current address. Is it . . .? (READ ADDRESS SHOWN ABOVE.)

111

[] YES -- ASK B1 NEXT

[] NO

112:SKIP

A2. IF ADDRESS IS INCORRECT, NOTE ADDRESS BELOW:

Street Address: _____ Apt. # _____

City, Town: _____ Zip: _____

A3. When did you move to (ADDRESS NOTED ABOVE)?

Month and Year: _____

EIA-876B (3/88)

EIA-876B--1988 Residential Transportation Energy Consumption Survey

B1. I have a description of the vehicles[s] mentioned at the time of our most recent contact with your household. I would like to verify [this/these] descriptions with you.

IF NO VEHICLES ARE LISTED ON FORM BELOW -- SKIP TO QUESTION C3.

VEHICLE NUMBER	01	02	03
TYPE			
MODEL YEAR	19	19	19
MAKE			
MODEL NAME			
B2. Do you still have [READ VEHICLE DESCRIPTION IN COLUMN ABOVE]?	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
--> IF "YES" FOR Q. B2, ASK:			
B3. Have I described it correctly? (IF NO, MAKE CORRECTIONS ABOVE)	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
--> IF "NO" FOR Q. B2, ASK:			
B4. On what day was the vehicle sold or disposed of?	_____ MONTH/DAY _____ YEAR	_____ MONTH/DAY _____ YEAR	_____ MONTH/DAY _____ YEAR
B5. Approximately, what was the odometer reading (total mileage) on the vehicle at the time it was sold or disposed of?	_____ MILES <input type="checkbox"/> DON'T KNOW	_____ MILES <input type="checkbox"/> DON'T KNOW	_____ MILES <input type="checkbox"/> DON'T KNOW

IF HOUSEHOLD STILL HAS ONE OR MORE OF VEHICLES LISTED ABOVE,
CONTINUE WITH QUESTION C1.

IF HOUSEHOLD NO LONGER HAS ANY OF THE VEHICLES LISTED ABOVE,
SKIP TO QUESTION C3.

EIA 876B (3/88)

CONTINUE HERE IF HOUSEHOLD STILL HAS ONE OR MORE OF VEHICLES LISTED ON COMPUTER-PRINTED PAGE.

- C1. Do you or other members of your household own or have for your regular personal use any cars, trucks, vans or similar vehicles, in addition to (DESCRIBE VEHICLES LISTED ON COMPUTER-PRINTED PAGE)?

1 [] YES

0 [] NO

6 [] DON'T KNOW

— SKIP TO Q. D1.

IF "YES", ASK:

- C2. How many additional vehicles do you have?

1 [] ONE

2 [] TWO

3 [] THREE

4 [] FOUR OR MORE

6 [] DON'T KNOW

— ASK Q. C5.

IF HOUSEHOLD NO LONGER HAS ANY OF THE VEHICLES LISTED ON COMPUTER-PRINTED PAGE, ASK:

- C3. Do you or other members of your household now own or have the regular use of any cars, trucks, vans or similar vehicles?

1 [] YES

0 [] NO

6 [] DON'T KNOW

— SKIP TO Q. D1.

IF "YES", ASK:

- C4. How many vehicles do you have?

1 [] ONE

2 [] TWO

3 [] THREE

4 [] FOUR OR MORE

6 [] DON'T KNOW

— ASK Q. C5.

EIA-876B (3/88)

IF "ONE OR MORE VEHICLES" ON Q.C2 OR C4, ASK Q.C5
FOR EACH VEHICLE, AND THEN CONTINUE WITH Q.C6.

C5. Please tell me the make, model name and
year (of each one). (SEE INSTRUCTION
BELOW)

MAKE
MODEL NAME
MODEL YEAR

A	B	C	D
_____	_____	_____	_____
_____	_____	_____	_____
19 _____	19 _____	19 _____	19 _____

C6. What type of vehicle is
the (READ: YEAR, MAKE,
MODEL -- FROM Q.C5.)
(READ CATEGORIES TO
RESPONDENT IF NECESSARY.)

STANDARD PASSENGER CAR
2-SEAT CAR
STATION WAGON
LARGE VAN
MINI VAN
PICKUP TRUCK
JEEP OR SIMILAR
OTHER (SPECIFY)

DON'T KNOW

1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
3 []	3 []	3 []	3 []
4 []	4 []	4 []	4 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
7 []	7 []	7 []	7 []
21 []	21 []	21 []	21 []
_____	_____	_____	_____
96 []	96 []	96 []	96 []

C7. In what month and year did you
get this vehicle?

MONTH
YEAR

_____	_____	_____	_____
19 _____	19 _____	19 _____	19 _____

C8. Do you happen to know the
total mileage (odometer reading)
for this vehicle?

YES
NO

1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []

IF "YES", ASK:

C9. What is the total mileage
(odometer reading)?

Is that the current mileage
for today's date, or some
other date?

MILES
DATE

_____	_____	_____	_____
_____	_____	_____	_____

IF "NO", ASK:

C10. Was the vehicle new when you
got it?

NO
YES

0 []	0 []	0 []	0 []
1 []	1 []	1 []	1 []

INTERVIEWER INSTRUCTIONS:

Q.C5 -- A model name may consist of several parts -- be sure to get the complete model name.
Here are some examples, where the complete model name is in parentheses: Ford (Galaxie), Chevrolet
(V10 Suburban), GMC (V15 Jimmy), Toyota (2WD Cargo Van). If respondent does not know the name of a
truck, probe for size (1/2 ton, 3/4 ton, etc.)

ASK EVERYONE

D1. Is there a possibility that your household will move any time during 1988?

1 [] YES, DEFINITELY

2 [] POSSIBLY

0 [] NO -- SKIP TO Q. D4.

IF "YES" OR "POSSIBLY", ASK:

D2. Do you happen to know when you (are/might be) moving?

MONTH/DAY/YEAR _____

APPROXIMATE TIME PERIOD _____

[] DON'T KNOW

D3. Do you happen to know what your new address will be?
(IF ADDRESS NOT KNOWN, PROBE FOR NAME/PHONE OF FRIEND OR NEIGHBOR WHO WILL KNOW NEW ADDRESS.)

NAME: _____

STREET: _____ APT. # _____

CITY/STATE: _____ ZIP: _____

PHONE: _____
(Area Code)

D4. INTERVIEWER -- CHECK TO SEE IF THERE ARE ADDITIONAL QUESTIONS ON THE NEXT PAGES.

[] YES, THERE ARE ADDITIONAL PAGES AND QUESTIONS.

BEGIN WITH THE FOLLOWING STATEMENT:

"We now have a few questions about heating your home this last winter. These will only take a minute."

NOW SKIP TO QUESTION S4 (ON THE NEXT PAGE) ----->

[] NO, NO ADDITIONAL PAGES AND QUESTIONS

READ AND COMPLETE THE FOLLOWING:

Thank you very much for your help. We appreciate your cooperation.
Have a nice day/evening.

(Interviewer)

(Date Completed)

(Time Completed)

AM
PM

INTERVIEWER NOTES: _____

EIA-876B (3/88)



ENERGY INFORMATION ADMINISTRATION

U.S. DEPARTMENT OF ENERGY

1988 RESIDENTIAL TRANSPORTATION ENERGY CONSUMPTION SURVEY

VEHICLE UPDATE FORM

AFTER YOU HAVE FILLED IN THE INFORMATION REQUESTED, PLEASE RETURN THE FORM TO THE
U.S. DEPARTMENT OF ENERGY, C/O RESPONSE ANALYSIS CORPORATION, BOX 7335,
PRINCETON, NJ 08543-9967, USING THE ENCLOSED SELF-ADDRESSED BUSINESS REPLY ENVELOPE.

This survey is voluntary and authorized under the Federal Energy Administration Act of 1974 (Public Law 93-275), as amended. Information about specific households will be kept strictly confidential. The data will be screened to protect the identity of individual households, and summarized within large groupings for statistical purposes.

EIA-876B
(3/88)

VEHICLE UPDATE FORM

We are now about halfway through the survey year for the 1988 Residential Transportation Energy Consumption Survey. We need to make sure we have current information about the vehicles in your household.

When we last contacted you, you had the vehicles described below:

QUESTION 1: Does your household still have the use of all of the vehicles listed above?

☐ YES, STILL HAVE ALL VEHICLES ---> SKIP TO QUESTION 2 ON NEXT PAGE.

☐ NO ---> ANSWER QUESTIONS "A" THROUGH "C" FOR EACH VEHICLE DISPOSED OF.

If you disposed of only one vehicle, put your answers in column 1.

If you disposed of a second vehicle, use column 2 for this vehicle.

VEHICLE DISPOSITION QUESTIONS

QUESTION	COLUMN 1	COLUMN 2
A. Which vehicle do you no longer have?	year: 19____ make: _____ model name: _____	year: 19____ make: _____ model name: _____
B. When did you sell or dispose of it? (GIVE YOUR BEST ESTIMATE)	month: _____ day: _____ year: _____	month: _____ day: _____ year: _____
C. What was the odometer reading (total mileage) when the vehicle was sold or disposed of? (GIVE YOUR BEST ESTIMATE)	_____ (odometer reading) <input type="checkbox"/> Don't know	_____ (odometer reading) <input type="checkbox"/> Don't know

NOW CONTINUE WITH QUESTION 2 ON THE NEXT PAGE ———>

EIA-876B (3/88)

QUESTION 2: Has your household bought or acquired any cars, trucks, vans, jeeps or similar vehicles that are not listed on the label on the facing page?

☐ NO, HAVE NOT BOUGHT OR ACQUIRED ANY OTHER VEHICLE --> CONTINUE WITH QUESTION 3 ON THE NEXT PAGE.

☐ YES, HAVE BOUGHT OR ACQUIRED ANOTHER VEHICLE --> PLEASE ANSWER QUESTIONS "A" THROUGH "D" BELOW FOR EACH VEHICLE BOUGHT OR ACQUIRED.

If you acquired only one vehicle, put your answers in Column 1.

If you acquired a second vehicle, use Column 2 for this vehicle.

VEHICLE ACQUISITION QUESTIONS

QUESTION	COLUMN 1	COLUMN 2
A. Please give the year, make, and model name of the acquired vehicle.	year: 19____ make: _____ model name: _____	year: 19____ make: _____ model name: _____
B. What was the date your household acquired the vehicle? (GIVE YOUR BEST ESTIMATE)	month: _____ day: _____ year: _____	month: _____ day: _____ year: _____
C. What is the current odometer reading (total mileage) of this vehicle? PLEASE OBTAIN THIS FROM THE ODOMETER ON THE VEHICLE.	_____ (odometer reading) <input type="checkbox"/> Don't know	_____ (odometer reading) <input type="checkbox"/> Don't know
D. What was the date when you recorded this odometer reading (total mileage)?	month: _____ day: _____	month: _____ day: _____

NOW CONTINUE WITH QUESTIONS 3 AND 4 ON THE NEXT PAGE ———>

EIA-876B (3/88)

QUESTION 3: Please look at the address label on the first page of this form.
Does it show your correct mailing address?

☐ YES --> PLEASE SKIP TO QUESTION 4, BELOW.

☐ NO ---> IF THE ADDRESS IS INCORRECT, PLEASE WRITE THE CORRECT ADDRESS BELOW.

■ STREET ADDRESS: _____

CITY/STATE: _____ ZIP: _____

■ When did you move to this address?

MONTH AND YEAR: _____

QUESTION 4: Finally, is there a possibility that your household will move any time within 1988?

☐ NO --> THIS FORM IS COMPLETE. SKIP THE FOLLOWING QUESTIONS.
PLEASE RETURN THE FORM USING THE ENCLOSED RETURN ENVELOPE.

☐ YES, DEFINITELY --> PLEASE ANSWER QUESTIONS 4-A AND 4-B BELOW.

☐ POSSIBLY --> PLEASE ANSWER QUESTIONS 4-A AND 4-B BELOW.

4-A. Do you happen to know when you are or might be moving?

MONTH/DAY OR APPROXIMATE DATE _____

☐ DON'T KNOW

4-B Do you happen to know what your new address will be?
(If not, please give the name and address of a relative or friend who
will know how to reach you.)

STREET ADDRESS: _____ APT.# _____

CITY/STATE: _____ ZIP: _____

PHONE: _____
(area code)

AFTER YOU HAVE FILLED IN THE INFORMATION REQUESTED, PLEASE RETURN THE FORM TO THE
U.S. DEPARTMENT OF ENERGY, C/O RESPONSE ANALYSIS CORPORATION, BOX 7335,
PRINCETON, NJ 08543-9967, USING THE ENCLOSED SELF-ADDRESSED BUSINESS REPLY ENVELOPE.

THANK YOU!

EIA-876B (3/88)



ENERGY INFORMATION ADMINISTRATION

U.S. DEPARTMENT OF ENERGY

1988 RESIDENTIAL TRANSPORTATION ENERGY CONSUMPTION SURVEY

VEHICLE UPDATE WORKSHEET

AFTER YOU HAVE FILLED IN THE INFORMATION REQUESTED, PLEASE KEEP THIS WORKSHEET NEAR YOUR TELEPHONE. WE WILL BE CALLING YOU IN A WEEK OR TWO TO GET THE INFORMATION. OR, IF YOU WILL BE DIFFICULT TO REACH BY PHONE, CALL COLLECT TO JIM DEVLIN AT (609) 921-3333.

PLEASE KEEP THIS WORKSHEET BY YOUR TELEPHONE --- EVEN IF YOU HAVE NOT HAD ANY VEHICLE CHANGES.

This survey is voluntary and authorized under the Federal Energy Administration Act of 1974 (Public Law 93-275), as amended. Information about specific households will be kept strictly confidential. The data will be screened to protect the identity of individual households, and summarized within large groupings for statistical purposes.

EIA-876B
(3/88)

VEHICLE UPDATE WORKSHEET

We are now about halfway through the survey year for the 1988 Residential Transportation Energy Consumption Survey. We need to make sure we have current information about the vehicles in your household.

When we last contacted you, you had the vehicles described below:

QUESTION 1: Does your household still have the use of all of the vehicles listed above?

☐ YES, STILL HAVE ALL VEHICLES ---> SKIP TO QUESTION 2 ON NEXT PAGE.

☐ NO ---> ANSWER QUESTIONS "A" THROUGH "C" FOR EACH VEHICLE DISPOSED OF.

If you disposed of only one vehicle, put your answers in column 1.

If you disposed of a second vehicle, use column 2 for this vehicle.

VEHICLE DISPOSITION QUESTIONS

QUESTION	COLUMN 1	COLUMN 2
A. Which vehicle do you no longer have?	year: 19__ make: _____ model name: _____	year: 19__ make: _____ model name: _____
B. When did you sell or dispose of it? (GIVE YOUR BEST ESTIMATE)	month: _____ day: _____ year: _____	month: _____ day: _____ year: _____
C. What was the odometer reading (total mileage) when the vehicle was sold or disposed of? (GIVE YOUR BEST ESTIMATE)	_____ (odometer reading) <input type="checkbox"/> Don't know	_____ (odometer reading) <input type="checkbox"/> Don't know

NOW CONTINUE WITH QUESTION 2 ON THE NEXT PAGE ———>

EIA-876B (3/88)

QUESTION 2: Has your household bought or acquired any cars, trucks, vans, jeeps or similar vehicles that are not listed on the label on the facing page?

☐ NO, HAVE NOT BOUGHT OR ACQUIRED ANY OTHER VEHICLE --> CONTINUE WITH QUESTION 3 ON THE NEXT PAGE.

☐ YES, HAVE BOUGHT OR ACQUIRED ANOTHER VEHICLE --> PLEASE ANSWER QUESTIONS "A" THROUGH "D" BELOW FOR EACH VEHICLE BOUGHT OR ACQUIRED.

If you acquired only one vehicle, put your answers in Column 1.

If you acquired a second vehicle, use Column 2 for this vehicle.

VEHICLE ACQUISITION QUESTIONS

QUESTION	COLUMN 1	COLUMN 2
A. Please give the year, make, and model name of the acquired vehicle.	year: 19____ make: _____ model name: _____	year: 19____ make: _____ model name: _____
B. What was the date your household acquired the vehicle? (GIVE YOUR BEST ESTIMATE)	month: _____ day: _____ year: _____	month: _____ day: _____ year: _____
C. What is the current odometer reading (total mileage) of this vehicle? PLEASE OBTAIN THIS FROM THE ODOMETER ON THE VEHICLE.	_____ (odometer reading) <input type="checkbox"/> Don't know	_____ (odometer reading) <input type="checkbox"/> Don't know
D. What was the date when you recorded this odometer reading (total mileage)?	month: _____ day: _____	month: _____ day: _____

NOW CONTINUE WITH QUESTIONS 3 AND 4 ON THE NEXT PAGE ———>

EIA-876B (3/88)

QUESTION 3: Please look at the address label on the first page of this worksheet.
Does it show your correct mailing address?

☐ YES --> PLEASE SKIP TO QUESTION 4, BELOW.

☐ NO ---> IF THE ADDRESS IS INCORRECT, PLEASE WRITE THE CORRECT ADDRESS BELOW.

- STREET ADDRESS: _____
CITY/STATE: _____ ZIP: _____
- When did you move to this address?
MONTH AND YEAR: _____

QUESTION 4: Finally, is there a possibility that your household will move any time within 1988?

☐ NO --> THIS WORKSHEET IS COMPLETE. SKIP THE FOLLOWING QUESTIONS.
PLEASE KEEP THE WORKSHEET NEAR YOUR PHONE.

☐ YES, DEFINITELY --> PLEASE ANSWER QUESTION 4A BELOW.

☐ POSSIBLY --> PLEASE ANSWER QUESTION 4A BELOW.

4A. Do you happen to know when you are or might be moving?

MONTH/DAY OR APPROXIMATE DATE _____

☐ DON'T KNOW

AFTER YOU HAVE FILLED IN THE INFORMATION REQUESTED, PLEASE KEEP THIS WORKSHEET NEAR YOUR TELEPHONE. WE WILL BE CALLING YOU IN A WEEK OR TWO TO GET THE INFORMATION. OR, IF YOU WILL BE DIFFICULT TO REACH BY PHONE, CALL COLLECT TO JIM DEVLIN AT (609) 921-3333.

PLEASE KEEP THIS WORKSHEET BY YOUR TELEPHONE --- EVEN IF YOU HAVE NOT HAD ANY VEHICLE CHANGES.

THANK YOU!

EIA-876B (3/88)

1988 RESIDENTIAL TRANSPORTATION ENERGY CONSUMPTION SURVEY
END-OF-YEAR QUESTIONNAIRE
(TELEPHONE SURVEY)

FORM APPROVAL:
OMB No. 1905-0068
EXPIRES: 9/30/90

CALL #	CALL RECORD			CALL RESULT CODE									INTERVIEWER	NOTES, INCLUDING: o Contact person o Best time for callback o Appointments o REFUSALS* (REMEMBER TO WRITE E.S.T. FOR ALL TIMES RECORDED.)
	DAY OF WEEK	DATE	TIME	B U S Y	A M	N A	R A	L A B	D I S	T H E R	R* E F	C M		
1				1	2	3	4	5	6	7	8*	9		
2				1	2	3	4	5	6	7	8*	9		
3				1	2	3	4	5	6	7	8*	9		
4				1	2	3	4	5	6	7	8*	9		
5				1	2	3	4	5	6	7	8*	9		
6				1	2	3	4	5	6	7	8*	9		
7				1	2	3	4	5	6	7	8*	9		
8				1	2	3	4	5	6	7	8*	9		

*IMPORTANT: ALL REFUSALS SHOULD BE 1) SPECIFIED AS "HARD" OR "SOFT," AND
2) DESCRIBED (WRITE REASONS AND STATEMENT.)

ASK FIRST TO SPEAK WITH THE PERSON WHOSE NAME APPEARS ON THE LABEL. IF HE/SHE IS UNAVAILABLE, THE INTERVIEW MAY BE COMPLETED WITH A SPOUSE OR OTHER KNOWLEDGEABLE MEMBER OF THE HOUSEHOLD.

Hello, this is _____ calling from Response Analysis Corporation in Princeton, New Jersey. We recently sent you a letter about a special study that the U.S. Department of Energy has asked us to do on energy use for household vehicles.

IF ASKED ABOUT CONFIDENTIALITY, READ:

This survey is voluntary and authorized under the Federal Energy Administration Act of 1974 (Public Law 93-275), as amended. Information about specific households will be kept strictly confidential. The data will be screened to protect the identity of individual households, and summarized within large groupings for statistical purposes.

EIA-876C (9/88)

1.

A1. First I would like to check that we have your correct mailing address.
Is it . . .? (READ ADDRESS SHOWN ON LABEL.)

☐ YES -- CONTINUE WITH QUESTION A2.

☐ NO -----
↓

A1.A IF <u>MAILING</u> ADDRESS IS INCORRECT, WRITE IN THE CORRECT ADDRESS BELOW:	
Street Address: _____	Apt. # _____
City, State: _____	Zip: _____
A1.B When did you move to (ADDRESS NOTED ABOVE)?	
Month and Year: _____	

A2. Within the last couple of weeks, we mailed you some cards for recording the total mileage or odometer reading(s) for your vehicle(s).

A2.A Did you receive the cards?

☐ YES -- CONTINUE WITH QUESTION A2.B

☐ NO -- SKIP TO QUESTION A3.
TRY TO GET RESPONDENT TO VISIT VEHICLE(S) FOR ODOMETER
READING(S) WHILE YOU WAIT.
ARRANGE FOR CALLBACK IF NECESSARY.

IF "YES" FOR Q. A2.A, ASK:

A2.B Have you filled out these cards yet?

☐ YES -- CONTINUE WITH QUESTION A2.C

☐ NO -- SKIP TO QUESTION A3.
TRY TO GET RESPONDENT TO VISIT VEHICLE(S) FOR ODOMETER
READING(S) WHILE YOU WAIT.
ARRANGE FOR CALLBACK IF NECESSARY.

IF "YES" FOR Q. A2.B, ASK:

A2.C Can you bring these cards to the phone?

☐ YES -- SKIP TO QUESTION A3.

☐ NO -- SKIP TO QUESTION A3.
TRY TO GET RESPONDENT TO VISIT VEHICLE(S) FOR ODOMETER
READING(S) WHILE YOU WAIT.
ARRANGE FOR CALLBACK IF NECESSARY.

IF RESPONDENT SAYS HOUSEHOLD "Has no vehicles" or "Doesn't have those vehicles you sent cards for"



SKIP TO QUESTION C3 (GREEN PAGES) IF FOLD-OUT PAGES SHOW NO VEHICLES.

or

SKIP TO QUESTION A3 IF FOLD-OUT PAGES SHOW 1 OR MORE VEHICLES. FOR VEHICLES RESPONDENT CLAIMS HE/SHE NO LONGER HAS, SAY YOU JUST WANT TO VERIFY SOME INFORMATION FOR THE RECORD.

USE WHITE PAGES FOR VEHICLES #1-#4 OF FOLD-OUT PAGE.
IF NO VEHICLE #1-#4 IS LISTED ON FOLD-OUT PAGE, SKIP TO Q. SA3 (YELLOW PAGES)

A3. I have a description of the vehicle(s) mentioned at the time of our most recent contact with your household. I would like to verify (this/these) descriptions with you.

Do you still have: YES
(DESCRIBE EACH VEHICLE #1-#4 (continue with Q.A4)
THAT IS LISTED ON THE FOLD-OUT PAGE.)

NO
(skip to Q. B1 on blue page)

NEVER HAD

IF "YES" FOR Q.A3., ASK:

A4. Have I described it correctly?
(IF NO, CORRECT COMPUTER FOLD-OUT. ALSO TRY TO OBTAIN MISSING YEAR, MAKE OR MODEL.)

YES

NO

A5. What was the odometer reading (total mileage) that you recorded on the Odometer Card that we sent you? (READ BACK TO VERIFY)

MILES

DON'T KNOW

A6. Was the mileage recorded on (DATE SPECIFIED ON COMPUTER FOLD-OUT)?

YES

NO

DON'T KNOW

IF "NO" FOR Q.A6., ASK:

A7. On what date was it recorded?

MONTH

DAY

DON'T KNOW

V E H I C L E N U M B E R			
1	2	3	4
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
8 []	8 []	8 []	8 []
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
_____	_____	_____	_____
[]	[]	[]	[]
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
6 []	6 []	6 []	6 []
_____	_____	_____	_____
_____	_____	_____	_____
[]	[]	[]	[]

THERE ARE NO QUESTIONS NUMBERED A8 THROUGH A14.
CONTINUE WITH QUESTION A15.

INTERVIEWER: REMIND RESPONDENT WHICH VEHICLE YOU ARE DISCUSSING -- E.G., FORD LTD, DODGE PICKUP, ETC.

		V E H I C L E N U M B E R			
		1	2	3	4
A15. Does this vehicle use gasoline or diesel fuel?	GASOLINE	1 []	1 []	1 []	1 []
	DIESEL FUEL	2 []	2 []	2 []	2 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "GASOLINE" FOR Q.A15., ASK:					
A16. During the past year, did you use mostly leaded or unleaded gasoline in this vehicle?	LEADED	1 []	1 []	1 []	1 []
	UNLEADED	2 []	2 []	2 []	2 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "UNLEADED" FOR Q.A16., ASK:					
A17. During the past year, did you use mostly regular or premium gasoline in this vehicle -- or some grade in-between regular and premium?	REGULAR	1 []	1 []	1 []	1 []
	PREMIUM	2 []	2 []	2 []	2 []
	INTERMEDIATE	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
A18. When you bought fuel for this vehicle during the past year, did you use full-service pumps or self-service pumps for most purchases ? (RECORD MINI-SERVE AS SELF-SERVICE)	FULL-SERVICE	1 []	1 []	1 []	1 []
	SELF-SERVICE (includes mini)	2 []	2 []	2 []	2 []
	BOTH EQUALLY	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
<p>■ FOR NEXT VEHICLE #1-#4 ON COMPUTER FOLD-OUT PAGE, GO BACK TO QUESTION A3.</p> <p>■ AFTER LAST VEHICLE #1-#4 ON COMPUTER FOLD-OUT PAGE, SKIP TO QUESTION SA3 (YELLOW PAGES)</p>					

IF "NO" FOR Q.A3, ASK:

B1. Was this vehicle sold, traded in or disposed of, or did the owner move away?
 SOLD, TRADED OR DISPOSED OF
 OWNER MOVED AWAY
 DON'T KNOW

IF "SOLD/TRADED/DISPOSED" FOR Q.B1, ASK QUESTIONS B2-B7:

B2. In what month and year did you dispose of this vehicle?
 MONTH
 YEAR
 DON'T KNOW MONTH
 DON'T KNOW YEAR

B3. Approximately, what was the odometer reading (total mileage) on the vehicle at the time that you sold, traded or disposed of it?
 MILES
 DON'T KNOW

B4. Did this vehicle use gasoline or diesel fuel?
 GASOLINE
 DIESEL FUEL
 OTHER (specify)
 DON'T KNOW

V E H I C L E N U M B E R			
1	2	3	4
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
6 []	6 []	6 []	6 []
_____	_____	_____	_____
_____	_____	_____	_____
96 []	96 []	96 []	96 []
96 []	96 []	96 []	96 []
_____	_____	_____	_____
[]	[]	[]	[]
_____	_____	_____	_____
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
5 []	5 []	5 []	5 []
_____	_____	_____	_____
6 []	6 []	6 []	6 []



		V E H I C L E N U M B E R			
		1	2	3	4
IF "GASOLINE" FOR Q.B4, ASK:					
B5. During the past year, did you use mostly leaded or unleaded gasoline in this vehicle?	LEADED	1 []	1 []	1 []	1 []
	UNLEADED	2 []	2 []	2 []	2 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "UNLEADED" FOR Q.B5, ASK:					
B6. During the past year, did you use mostly regular or premium gasoline in this vehicle -- or some grade in-between regular and premium?	REGULAR	1 []	1 []	1 []	1 []
	PREMIUM	2 []	2 []	2 []	2 []
	INTERMEDIATE	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
B7. When you bought fuel for this vehicle during the past year, did you use full-service pumps or self-service pumps for most purchases? (RECORD MINI-SERVE AS SELF-SERVICE)	FULL-SERVICE	1 []	1 []	1 []	1 []
	SELF-SERVICE (includes mini)	2 []	2 []	2 []	2 []
	BOTH EQUALLY	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "OWNER MOVED AWAY" FOR Q.B1., ASK:					
B8. In what month and year did the owner move away with this vehicle?	MONTH	_____	_____	_____	_____
	YEAR	_____	_____	_____	_____
	DON'T KNOW MONTH	96 []	96 []	96 []	96 []
	DON'T KNOW YEAR	96 []	96 []	96 []	96 []

- FOR THE NEXT VEHICLE #1-#4 ON COMPUTER FOLD-OUT PAGE, GO BACK TO QUESTION A3.
- AFTER THE LAST VEHICLE #1-#4 ON COMPUTER FOLD-OUT PAGE, SKIP TO QUESTION SA3 (YELLOW PAGES).

USE YELLOW PAGES FOR VEHICLES #5-#8 OF FOLD-OUT PAGE.

SA3. I have a description of the vehicle(s) mentioned at the time of our most recent contact with your household. I would like to verify (this/these) descriptions with you.

Do you still have: YES
(DESCRIBE EACH VEHICLE #5-#8 (continue
THAT IS LISTED ON THE with Q.SA4)
FOLD-OUT PAGE.) NO
(skip to Q.SB1
on pink page)

NEVER HAD

IF "YES" FOR Q.SA3, ASK Qs. SA4-SA22:

SA4. Have I described it YES
correctly? (IF NO, CORRECT COMPUTER
FOLD-OUT. ALSO TRY TO
OBTAIN MISSING YEAR, MAKE
OR MODEL.) NO

SA5. What was the odometer reading (total mileage) MILES
that you recorded on the Odometer Card that we sent
you? (READ BACK TO VERIFY) DON'T KNOW

SA6. Was the mileage recorded YES
on (DATE SPECIFIED ON
COMPUTER FOLD-OUT)? NO
DON'T KNOW

IF "NO" FOR Q.SA6, ASK:

SA7. On what date was it MONTH
recorded? DAY
DON'T KNOW

VEHICLE NUMBER			
5	6	7	8
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
8 []	8 []	8 []	8 []
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
_____	_____	_____	_____
[]	[]	[]	[]
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []
6 []	6 []	6 []	6 []
_____	_____	_____	_____
_____	_____	_____	_____
[]	[]	[]	[]

THERE ARE NO QUESTIONS NUMBERED SA8 THROUGH SA11.
CONTINUE WITH QUESTION SA12.

SA12. What is the Vehicle Identification Number for this vehicle?
(HAVE RESPONDENT READ THIS FROM THE VIN CARD FOR THAT VEHICLE. READ BACK TO VERIFY.
SEE INSTRUCTION BELOW.)

V E H I C L E N U M B E R	5	VIN: _____ VIN NOT OBTAINED [] VIN REFUSED []
	6	VIN: _____ VIN NOT OBTAINED [] VIN REFUSED []
	7	VIN: _____ VIN NOT OBTAINED [] VIN REFUSED []
	8	VIN: _____ VIN NOT OBTAINED [] VIN REFUSED []

INTERVIEWER: Describe respondent reason for refusing VIN.

		V E H I C L E N U M B E R			
		5	6	7	8
SA13. Does it have an automatic transmission or a manual shift?	AUTOMATIC	1 []	1 []	1 []	1 []
	MANUAL SHIFT	2 []	2 []	2 []	2 []
	DON'T KNOW	6 []	6 []	6 []	6 []
SA14. How many cylinders does the engine have?	2-CYLINDER	2 []	2 []	2 []	2 []
	4-CYLINDER	4 []	4 []	4 []	4 []
	5-CYLINDER	5 []	5 []	5 []	5 []
	6-CYLINDER	6 []	6 []	6 []	6 []
	8-CYLINDER	8 []	8 []	8 []	8 []
	OTHER (specify)	21 []	21 []	21 []	21 []
	DON'T KNOW	96 []	96 []	96 []	96 []

CONTINUE WITH Q. SA15, NEXT PAGE.

INTERVIEWER INSTRUCTIONS IF VIN EXPLANATION IS NEEDED:

The VIN provides information that allows researchers to estimate fuel economy for all types of cars, trucks and other vehicles. In this survey, your vehicles will represent those from thousands of other households that have similar vehicles.

The VIN is a set of codes assigned to a vehicle at the factory which, when decoded, describe several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle.

Your VIN and all other information that you provide, will be held confidential. No information that can be linked to your name and address will ever be provided to the Department of Energy, or to any other government agency.

INTERVIEWER: REMIND RESPONDENT WHICH VEHICLE YOU ARE DISCUSSING -- E.G., FORD LTD, DODGE PICKUP, ETC.

		VEHICLE NUMBER			
		5	6	7	8
SA15. Does it have front-wheel, rear-wheel or 4-wheel drive? (CHECK ALL THAT APPLY.)	FRONT WHEEL	1 []	1 []	1 []	1 []
	REAR-WHEEL	2 []	2 []	2 []	2 []
	4-WHEEL	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
SA16. Does the fuel system use a carburetor, fuel injection, or is it a diesel engine?	CARBURETOR	1 []	1 []	1 []	1 []
	FUEL INJECTION	2 []	2 []	2 []	2 []
	DIESEL	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
SA17. What is the engine size in liters or cubic inches? For example, engine sizes can range from 1 liter to 6.2 liters.	LITERS				
	CUBIC INCHES				
	OTHER (specify)	995 []	995 []	995 []	995 []
	DON'T KNOW	996 []	996 []	996 []	996 []
SA18. Is this vehicle used on the job by anyone in your household, not counting going to and from work?	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "YES" FOR Q. SA18, ASK:					
SA18.A Is it also used for non-business (personal) uses?	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []

CONTINUE WITH Q. SA19, NEXT PAGE.

INTERVIEWER: REMIND RESPONDENT WHICH VEHICLE YOU ARE DISCUSSING -- E.G., FORD LTD, DODGE PICKUP, ETC.

		V E H I C L E N U M B E R			
		5	6	7	8
SA19. Does this vehicle use gasoline or diesel fuel?	GASOLINE	1 []	1 []	1 []	1 []
	DIESEL FUEL	2 []	2 []	2 []	2 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "GASOLINE" FOR Q.SA19, ASK:					
SA20. During the past year, did you use mostly leaded or unleaded gasoline in this vehicle?	LEADED	1 []	1 []	1 []	1 []
	UNLEADED	2 []	2 []	2 []	2 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "UNLEADED" FOR Q.SA20, ASK:					
SA21. During the past year, did you use mostly regular or premium gasoline in this vehicle -- or some grade in-between regular and premium?	REGULAR	1 []	1 []	1 []	1 []
	PREMIUM	2 []	2 []	2 []	2 []
	INTERMEDIATE	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []
SA22. When you bought fuel for this vehicle during the past year, did you use full-service pumps or self-service pumps for most purchases ? (RECORD MINI-SERVE AS SELF-SERVICE)	FULL-SERVICE	1 []	1 []	1 []	1 []
	SELF-SERVICE (includes mini)	2 []	2 []	2 []	2 []
	BOTH EQUALLY	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
		_____	_____	_____	_____
	DON'T KNOW	6 []	6 []	6 []	6 []

■ ASK QUESTIONS SA3-SA22 FOR EACH VEHICLE #5-#8 ON THE FOLD-OUT PAGE.

■ AFTER LAST VEHICLE #5-#8 ON THE FOLD-OUT PAGE, SKIP TO EITHER QUESTION C1 OR C3 ON THE GREEN PAGES:

SKIP TO QUESTION C1 -- IF HOUSEHOLD STILL HAS 1 OR MORE OF THE VEHICLES ON THE COMPUTER FOLD-OUT PAGES.

SKIP TO QUESTION C3 -- IF HOUSEHOLD DOES NOT NOW HAVE ANY OF THE VEHICLES ON THE COMPUTER FOLD-OUT PAGES.

IF "NO" FOR Q.SA3, ASK:

SB1. Was this vehicle sold, traded in or disposed of, or did the owner move away?
 SOLD, TRADED OR DISPOSED OF
 OWNER MOVED AWAY
 DON'T KNOW

IF "SOLD/TRADED/DISPOSED" FOR Q.SB1, ASK Qs. SB2-SB7:

SB2. In what month and year did you dispose of this vehicle?
 MONTH
 YEAR
 DON'T KNOW MONTH
 DON'T KNOW YEAR

SB3. Approximately, what was the odometer reading (total mileage) on the vehicle at the time that you sold, traded or disposed of it?
 MILES
 DON'T KNOW

SB4. Did this vehicle use gasoline or diesel fuel?
 GASOLINE
 DIESEL FUEL
 OTHER (specify)
 DON'T KNOW

VEHICLE NUMBER			
5	6	7	8
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
6 []	6 []	6 []	6 []
96 []	96 []	96 []	96 []
96 []	96 []	96 []	96 []
[]	[]	[]	[]
1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []



		V E H I C L E N U M B E R				
		5	6	7	8	
IF "GASOLINE" FOR Q.SB4, ASK:						
SB5. During the past year, did you use mostly leaded or unleaded gasoline in this vehicle?	LEADED	1 []	1 []	1 []	1 []	
	UNLEADED	2 []	2 []	2 []	2 []	
	OTHER (specify)	5 []	5 []	5 []	5 []	
	DON'T KNOW	6 []	6 []	6 []	6 []	
IF "UNLEADED" FOR Q.SB5, ASK:						
SB6. During the past year, did you use mostly regular or premium gasoline in this vehicle -- or some grade in-between regular and premium?	REGULAR	1 []	1 []	1 []	1 []	
	PREMIUM	2 []	2 []	2 []	2 []	
	INTERMEDIATE	3 []	3 []	3 []	3 []	
	OTHER (specify)	5 []	5 []	5 []	5 []	
		DON'T KNOW	6 []	6 []	6 []	6 []
SB7. When you bought fuel for this vehicle during the past year, did you use full-service pumps or self-service pumps for most purchases? (RECORD MINI-SERVE AS SELF-SERVICE)	FULL-SERVICE	1 []	1 []	1 []	1 []	
	SELF-SERVICE (includes mini)	2 []	2 []	2 []	2 []	
	BOTH EQUALLY	3 []	3 []	3 []	3 []	
	OTHER (specify)	5 []	5 []	5 []	5 []	
		DON'T KNOW	6 []	6 []	6 []	6 []
IF "OWNER MOVED AWAY" FOR Q.SB1., ASK:						
SB8. In what month and year did the owner move away with this vehicle?	MONTH	_____	_____	_____	_____	
	YEAR	_____	_____	_____	_____	
		DON'T KNOW MONTH	96 []	96 []	96 []	96 []
		DON'T KNOW YEAR	96 []	96 []	96 []	96 []

- IF THERE IS A NEXT VEHICLE #5-#8 ON THE FOLD-OUT PAGE, GO BACK TO QUESTION SA3 (YELLOW PAGES) FOR THAT VEHICLE.
- AFTER LAST VEHICLE #5-#8 ON THE FOLD-OUT PAGE, SKIP TO EITHER QUESTION C1 OR C3 ON THE GREEN PAGES:
 - SKIP TO QUESTION C1 -- IF HOUSEHOLD STILL HAS 1 OR MORE OF THE VEHICLES ON THE COMPUTER FOLD-OUT PAGES.
 - SKIP TO QUESTION C3 -- IF HOUSEHOLD DOES NOT NOW HAVE ANY OF THE VEHICLES ON THE COMPUTER FOLD-OUT PAGES.

USE GREEN PAGES FOR NEWLY ACQUIRED VEHICLES
THAT ARE NOT LISTED ON THE FOLD-OUT PAGES.

IF HOUSEHOLD STILL HAS ONE OR MORE VEHICLES ON COMPUTER FOLD-OUT PAGES.

- C1. Do you or other members of your household own or have for your regular personal use any cars, trucks, vans or similar vehicles, in addition to the vehicles we have already discussed?
(BRIEFLY DESCRIBE THE VEHICLES LISTED ON THE FOLD-OUT PAGES.)

1 ☐ YES
0 ☐ NO
6 ☐ DON'T KNOW

STOP.
THEN SAY: That's all I need to know. Thank you for your cooperation.

IF "YES", ASK:

- C2. How many additional vehicles do you have?

1 ☐ ONE
2 ☐ TWO
3 ☐ THREE
4 ☐ FOUR OR MORE
6 ☐ DON'T KNOW

SKIP TO Q.C5

IF HOUSEHOLD NO LONGER HAS ANY VEHICLES ON COMPUTER FOLD-OUT PAGES.

- C3. Do you or other members of your household now own or have the regular use of any cars, trucks, vans or similar vehicles?

1 ☐ YES
0 ☐ NO
6 ☐ DON'T KNOW

STOP.
THEN SAY: That's all I need to know. Thank you for your cooperation.

IF "YES", ASK:

- C4. How many vehicles do you have?

1 ☐ ONE
2 ☐ TWO
3 ☐ THREE
4 ☐ FOUR OR MORE
6 ☐ DON'T KNOW

ASK Q. C5.

IF "ONE OR MORE VEHICLES" ON Q.C2 OR C4, ASK Q. C5 FOR EACH VEHICLE, AND THEN CONTINUE WITH Q. C6.

C5. Please tell me the make, model name and year (of each one).
(SEE INSTRUCTION BELOW)

MAKE
MODEL NAME
MODEL YEAR
DON'T KNOW MAKE
DON'T KNOW MODEL
DON'T KNOW YEAR

A	B	C	D
_____	_____	_____	_____
_____	_____	_____	_____
19 _____	19 _____	19 _____	19 _____
[]	[]	[]	[]
[]	[]	[]	[]
[]	[]	[]	[]

C6. What type of vehicle is the
(READ: YEAR, MAKE, MODEL -- FROM Q. C5)
(READ CATEGORIES TO RESPONDENT IF NECESSARY)

STANDARD PASSENGER CAR
2-SEAT CAR
STATION WAGON
LARGE VAN
MINI VAN
PICKUP TRUCK
JEEP OR SIMILAR
OTHER (specify)

DON'T KNOW

1 []	1 []	1 []	1 []
2 []	2 []	2 []	2 []
3 []	3 []	3 []	3 []
4 []	4 []	4 []	4 []
5 []	5 []	5 []	5 []
6 []	6 []	6 []	6 []
7 []	7 []	7 []	7 []
21 []	21 []	21 []	21 []
_____	_____	_____	_____
96 []	96 []	96 []	96 []

C7. In what month and year did you get this vehicle?

MONTH
YEAR
DON'T KNOW MONTH
DON'T KNOW YEAR

_____	_____	_____	_____
19 _____	19 _____	19 _____	19 _____
96 []	96 []	96 []	96 []
96 []	96 []	96 []	96 []



CONTINUE WITH Q. C8, NEXT PAGE.

INTERVIEWER INSTRUCTIONS:

Q.C5 -- A model name may consist of several parts -- be sure to get the complete model name. Here are some examples, where the complete model name is in parentheses: Ford (Galaxie), Chevrolet (V10 Suburban), GMC (V15 Jimmy), Toyota (2WD Cargo Van). If respondent does not know the name of a truck, probe for size (1/2 ton, 3/4 ton, etc.)

C8. Do you happen to know the total mileage (odometer) reading after the last use of the vehicle on (DATE FROM COMPUTER FOLD-OUT)?

YES
NO

A	B	C	D
1 []	1 []	1 []	1 []
0 []	0 []	0 []	0 []

IF "YES", ASK:

C9. What was the mileage as of (DATE FROM COMPUTER FOLD-OUT)

MILES

_____	_____	_____	_____
-------	-------	-------	-------

IF "NO", ASK:

C10. Do you know the mileage as of a different date?

NO

0 []	0 []	0 []	0 []
-------	-------	-------	-------

YES

1 []	1 []	1 []	1 []
-------	-------	-------	-------

DATE

_____	_____	_____	_____
-------	-------	-------	-------

MILES

_____	_____	_____	_____
-------	-------	-------	-------

C10.A Approximately how many miles have you driven this vehicle since you got it? (REFER TO DATE FROM Q. C7 AS NECESSARY)

MILES

_____	_____	_____	_____
-------	-------	-------	-------

DON'T KNOW

[]	[]	[]	[]
-----	-----	-----	-----

C11. Do you know the Vehicle Identification Number for this vehicle? (SEE INSTRUCTION BELOW)

YES

1 []	1 []	1 []	1 []
-------	-------	-------	-------

NO

0 []	0 []	0 []	0 []
-------	-------	-------	-------

IF "YES", ASK:

C12. What is the Vehicle Identification Number for this vehicle? (VERIFY WITH RESPONDENT)

V E H I C L E	A	VIN: _____	VIN NOT OBTAINED []	VIN REFUSED []
	B	VIN: _____	VIN NOT OBTAINED []	VIN REFUSED []
N U M B E R	C	VIN: _____	VIN NOT OBTAINED []	VIN REFUSED []
	D	VIN: _____	VIN NOT OBTAINED []	VIN REFUSED []

INTERVIEWER: Describe respondent reason for refusing VIN.

CONTINUE WITH Q. C13, NEXT PAGE.

INTERVIEWER INSTRUCTIONS IF VIN EXPLANATION IS NEEDED:

The VIN provides information that allows researchers to estimate fuel economy for all types of cars, trucks and other vehicles. In this survey, your vehicles will represent those from thousands of other households that have similar vehicles.

The VIN is a set of codes assigned to a vehicle at the factory which, when decoded, describe several of the vehicle's characteristics. These characteristics may then be used to calculate an estimated miles per gallon for that specific type of vehicle.

Your VIN and all other information that you provide, will be held confidential. No information that can be linked to your name and address will ever be provided to the Department of Energy, or to any other government agency.

INTERVIEWER: REMIND RESPONDENT WHICH VEHICLE YOU ARE DISCUSSING -- E.G., FORD LTD, DODGE PICKUP, ETC.

		A	B	C	D
C13. Does it have an automatic transmission or a manual shift?	AUTOMATIC	1 []	1 []	1 []	1 []
	MANUAL SHIFT	2 []	2 []	2 []	2 []
	DON'T KNOW	6 []	6 []	6 []	6 []
C14. How many cylinders does the engine have?	2-CYLINDER	2 []	2 []	2 []	2 []
	4-CYLINDER	4 []	4 []	4 []	4 []
	5-CYLINDER	5 []	5 []	5 []	5 []
	6-CYLINDER	6 []	6 []	6 []	6 []
	8-CYLINDER	8 []	8 []	8 []	8 []
	OTHER (specify)	21 []	21 []	21 []	21 []
	DON'T KNOW	96 []	96 []	96 []	96 []
C15. Does it have front-wheel, rear-wheel or 4-wheel drive? (CHECK ALL THAT APPLY.)	FRONT WHEEL	1 []	1 []	1 []	1 []
	REAR-WHEEL	2 []	2 []	2 []	2 []
	4-WHEEL	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
C16. Does the fuel system use a carburetor, fuel injection, or is it a diesel engine?	CARBURETOR	1 []	1 []	1 []	1 []
	FUEL INJECTION	2 []	2 []	2 []	2 []
	DIESEL	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
C17. What is the engine size in liters or cubic inches? For example, engine sizes can range from 1 liter to 6.2 liters.	LITERS				
	CUBIC INCHES				
	OTHER (specify)	995 []	995 []	995 []	995 []
	DON'T KNOW	996 []	996 []	996 []	996 []
C18. Is this vehicle used on the job by anyone in your household, not counting going to and from work?	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "YES" FOR Q. C18, ASK:					
C18.A Is it also used for non-business (personal) uses?	YES	1 []	1 []	1 []	1 []
	NO	0 []	0 []	0 []	0 []

CONTINUE WITH Q. C19, NEXT PAGE.

EIA-876C (9/88)

16.

INTERVIEWER: REMIND RESPONDENT WHICH VEHICLE YOU ARE DISCUSSING -- E.G., FORD LTD, DODGE PICKUP, ETC.

		A	B	C	D
C19. Does this vehicle use gasoline or diesel fuel?	GASOLINE	1 []	1 []	1 []	1 []
	DIESEL FUEL	2 []	2 []	2 []	2 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "GASOLINE" FOR Q.C19., ASK:					
C20. During the past year, did you use mostly leaded or unleaded gasoline in this vehicle?	LEADED	1 []	1 []	1 []	1 []
	UNLEADED	2 []	2 []	2 []	2 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
IF "UNLEADED" FOR Q.C20., ASK:					
C21. During the past year, did you use mostly regular or premium gasoline in this vehicle -- or some grade in-between regular and premium?	REGULAR	1 []	1 []	1 []	1 []
	PREMIUM	2 []	2 []	2 []	2 []
	INTERMEDIATE	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []
C22. When you bought fuel for this vehicle during the past year, did you use full-service pumps or self-service pumps for most purchases ? (RECORD MINI-SERVE AS SELF-SERVICE)	FULL-SERVICE	1 []	1 []	1 []	1 []
	SELF-SERVICE (includes mini)	2 []	2 []	2 []	2 []
	BOTH EQUALLY	3 []	3 []	3 []	3 []
	OTHER (specify)	5 []	5 []	5 []	5 []
	DON'T KNOW	6 []	6 []	6 []	6 []

INTERVIEWER: MAKE SURE YOU HAVE ASKED THE FULL SET OF "GREEN C QUESTIONS" (Q.C5-Q.C22) FOR EACH ADDITIONAL VEHICLE THE RESPONDENT TOLD YOU ABOUT IN Q.C2 OR Q.C4 .

THEN SAY "That's all I need to know. Thank you for your cooperation."

(Interviewer) (Date Completed) (Time Completed) AM PM

EIA-876C (9/88)

17.

**1988 Residential Transportation Energy Consumption Survey
End-of-Year Odometer Reading Card**

Form Approval:
OMB No. 1905-0068
Expires: 9/30/90



U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION

THIS CARD IS FOR YOUR:

Please put this card in your vehicle and write down the total
mileage (odometer reading) after the last use of this vehicle
on **WEDNESDAY, JANUARY 4, 1989**

MILES

After you have filled in the information requested, please keep this card near your telephone. We will be calling you to
get the information. Or, if you will be difficult to reach by phone, call collect to Jim Devlin at (609) 921-3333.

Please see the other side of this card for additional instructions.

THANKS FOR YOUR HELP!

EIA-876C
(9/88)

PLEASE READ THE OTHER SIDE OF THIS CARD FIRST

Additional instructions:

If your mileage meter (odometer) registers tenths of miles, please ignore these and record whole number of miles only.

If vehicle is not used on the day and date given on the other side of this card, please record the total mileage (odometer
reading) as of that day.

If the mileage meter (odometer) does not work, just let us know that.

One extra Odometer Reading Card was sent to you.

If your household now owns or regularly uses any **replacement or additional vehicle** that we didn't send an Odometer
Reading Card for, use the extra card for that vehicle, and fill in the TYPE, YEAR, MAKE and MODEL NAME on the card
label.

**1988 Residential Transportation Energy Consumption Survey
End-of-Year Odometer Reading Card**

Form Approval
OMB No.: 1905-0068
Expires: 9/30/90



U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION

THIS CARD IS FOR YOUR:

Please put this card in your vehicle and write down the total
mileage (odometer reading) after the last use of this vehicle
on **THURSDAY, JANUARY 12, 1989**

MILES

After you have filled out the information requested, please return the card to the U.S. Department of Energy, Box 7335,
Princeton, NJ 08543-9967, using the self-addressed Business Reply envelope.

Please see the other side of this card for additional instructions.

THANKS FOR YOUR HELP!

EIA-876C
(9/88)

PLEASE READ THE OTHER SIDE OF THIS CARD FIRST

Additional instructions:

If your mileage meter (odometer) registers tenths of miles, please ignore these and record whole number of miles only.

If vehicle is not used on the day and date given on the other side of this card, please record the total mileage (odometer reading) as of that day.

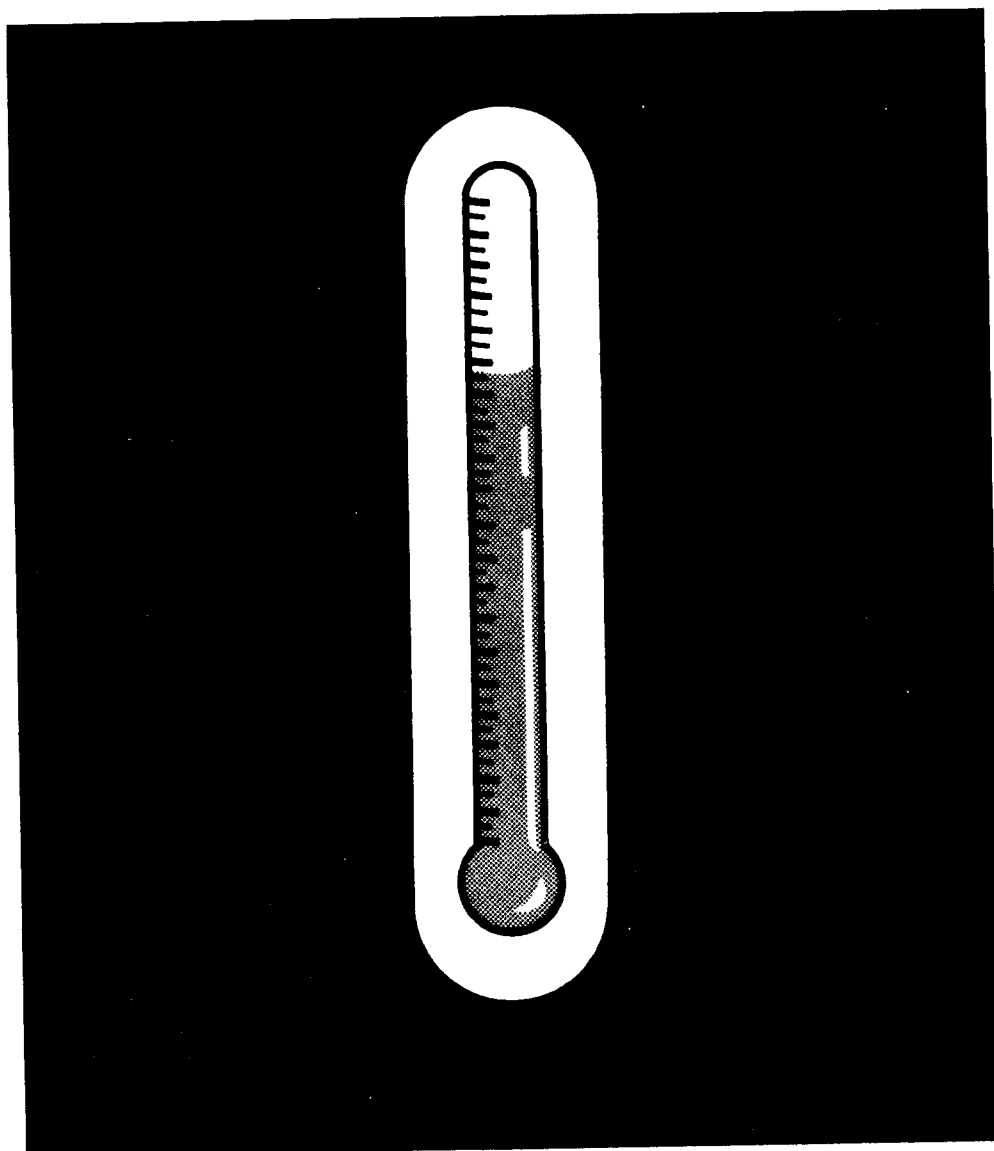
If the mileage meter (odometer) does not work, just let us know that.

One extra Odometer Reading Card was sent to you.

If your household now owns or regularly uses any **replacement or additional vehicle** that we didn't send an Odometer Reading Card for, use the extra card for that vehicle, and fill in the TYPE, YEAR, MAKE and MODEL NAME on the card label.

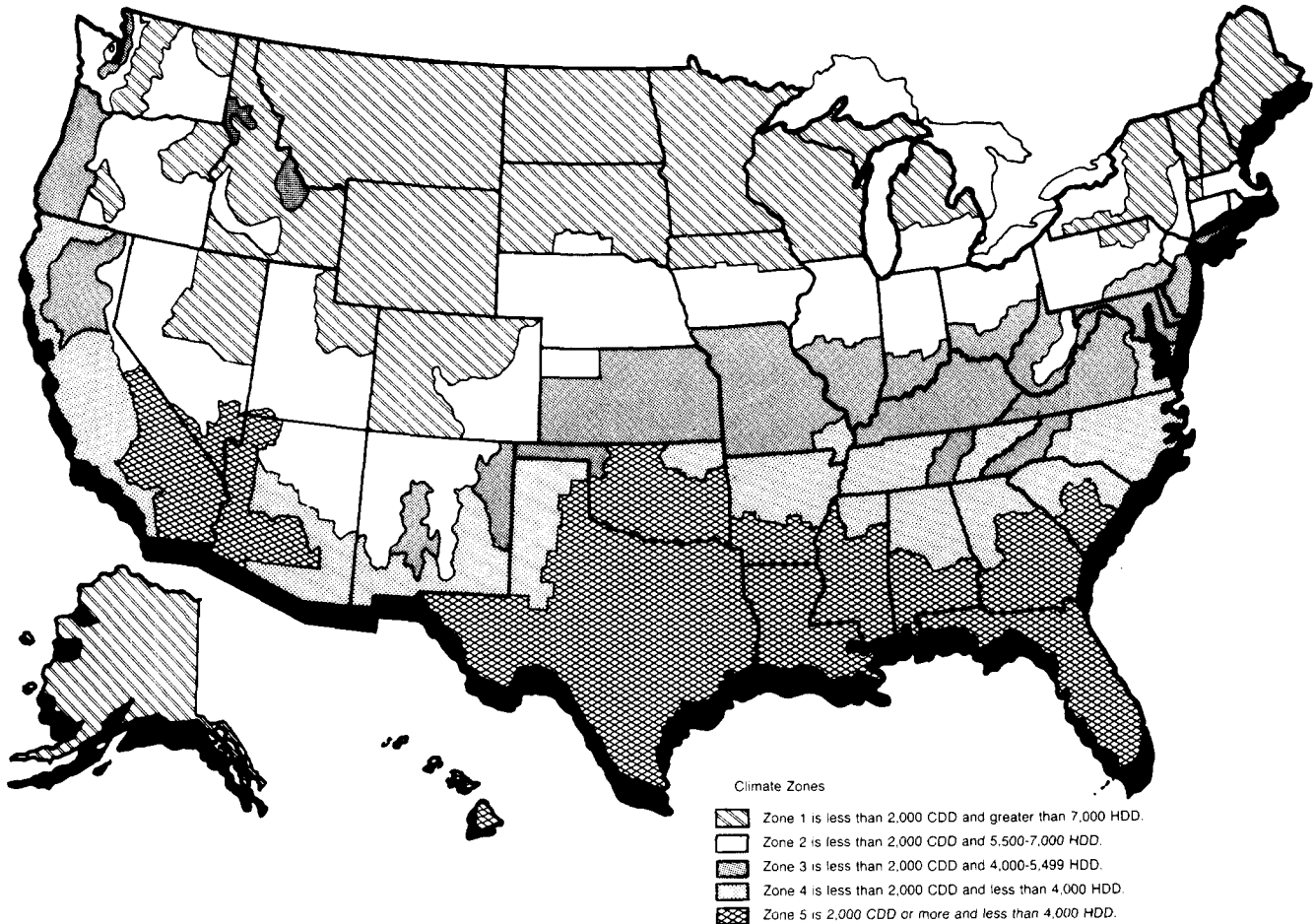
Appendix E

U.S. Climate Zone Map



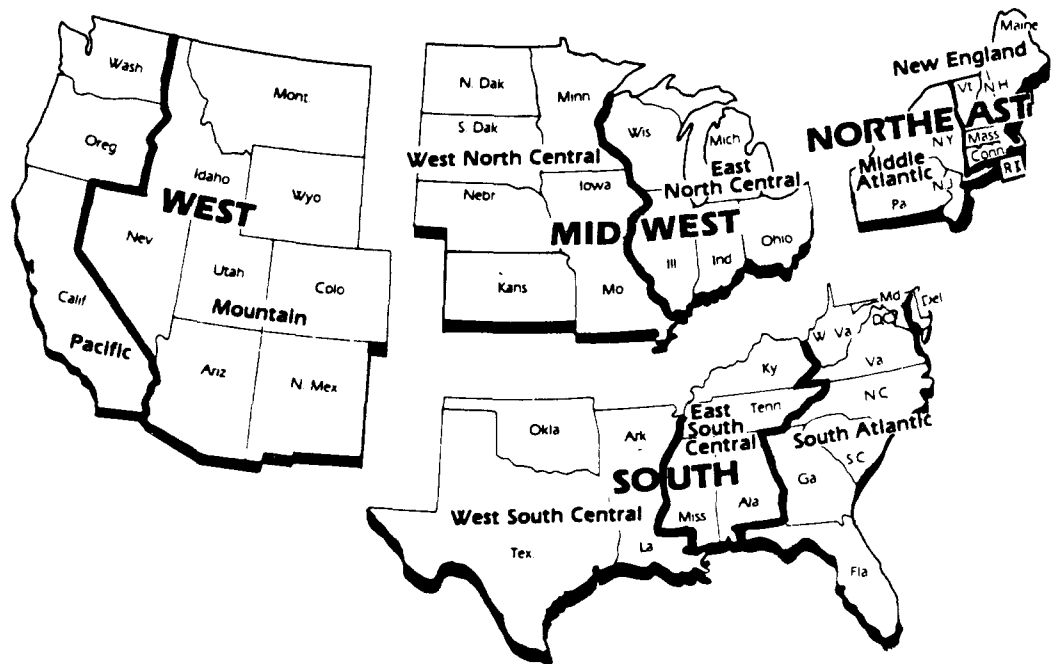
Appendix E

U.S. Climate Zone Map



Appendix F

U.S. Census Regions and Divisions



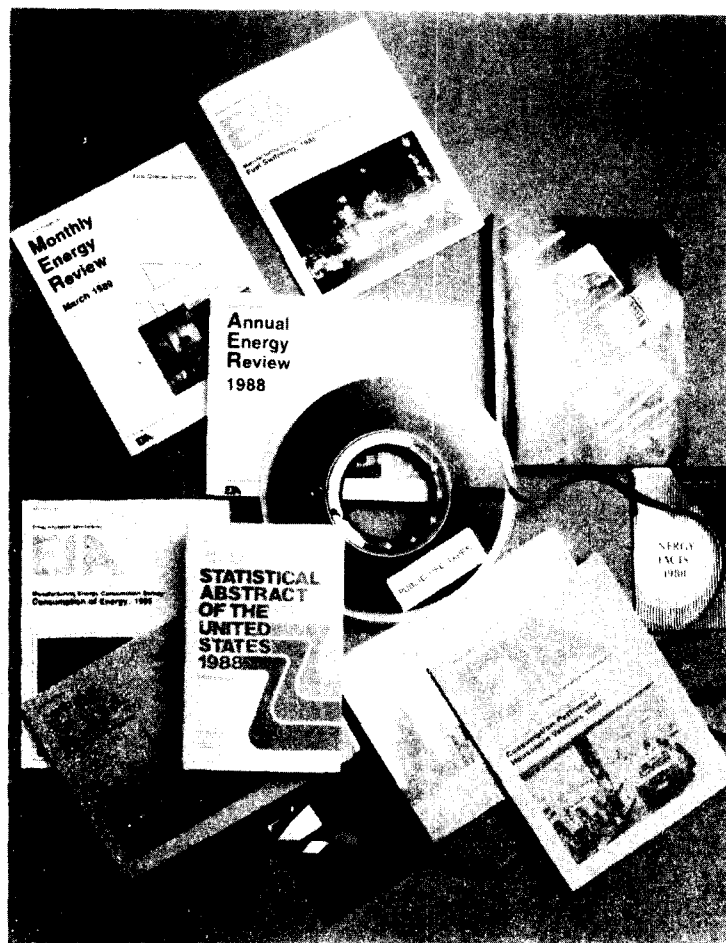
Appendix F

U.S. Census Regions and Divisions



Appendix G

Related EIA Publications on Energy Consumption



Appendix G

Related EIA Publications on Energy Consumption

These publications are available from the National Energy Information Center or the Superintendent of Documents. See the inside cover of this report on how to obtain copies of these publications. Please note that the prices quoted are subject to change.

In addition to the reports listed below, public use data tapes for the residential, residential transportation and commercial sectors are available from the National Technical Information Service (NTIS). To obtain information on how to order tapes, you may call NTIS at 703/487-4807.

Residential Transportation Sector

Residential Transportation Energy Consumption Survey: Consumption Patterns of Household Vehicles 1985; April 1987, DOE/EIA-0464(85), GPO Stock No. 061-003-00521-7, \$8.50.

Residential Transportation Energy Consumption Survey: Consumption Patterns of Household Vehicles, 1983; January 1985, DOE/EIA-0464(83), GPO Stock No. 061-003-00420-2, \$4.50.

Residential Energy Consumption Survey: Consumption Patterns of Household Vehicles, Supplement: January 1981 to September 1981; February 1983, DOE/EIA-0328, GPO Stock No. 061-003-00297-8, \$4.75.

Residential Energy Consumption Survey: Consumption Patterns of Household Vehicles, June 1979 to December 1980; April 1982, DOE/EIA-0319 (no GPO Stock No.).

Residential Sector

Housing Characteristics

Housing Characteristics 1987; May 1989, DOE/EIA-0314(87), GPO Stock No. 061-003-00619-1, \$13.00.

Residential Energy Consumption Survey: Housing Characteristics 1984; October 1986, DOE/EIA-0314(84), GPO Stock No. 061-003-00499-7, \$12.00.

Residential Energy Consumption Survey: Housing Characteristics, 1982; August 1984, DOE/EIA-0314(82), GPO Stock No. 061-003-00393-1, \$7.00.

Residential Energy Consumption Survey Housing Characteristics, 1981; August 1983, DOE/EIA-0314(81), GPO Stock No. 061-003-00330-3, \$6.50.

Residential Energy Consumption Survey: Housing Characteristics, 1980; June 1982, DOE/EIA-0314, GPO Stock No. 061-003-00256-1, \$11.00.

Residential Energy Consumption Survey: Characteristics of the Housing Stock and Households, 1978; February 1980, DOE/EIA-0207/2, GPO Stock No. 061-003-00093-2, \$4.25.

Residential Energy Consumption Survey: Conservation; February 1980, DOE/EIA-0207/3, GPO Stock No. 061003-00087-8, \$6.00.

Preliminary Conservation Tables from the National Interim Energy Consumption Survey; August 1979, DOE/EIA-0193/P (no GPO Stock No.).

Characteristics of the Housing Stock and Households: Preliminary Findings from the National Interim Energy Consumption Survey; October 1979, DOE/EIA-0199/P (no GPO Stock No.).

Consumption and Expenditures

Household Energy Consumption and Expenditures 1987, Part 2: Regional Data; DOE/EIA-0321/2(87) (no GPO Stock No.).

Household Energy Consumption and Expenditures 1987, Part 1: National Data; October 1989, DOE/EIA-0321/1(87), GPO Stock No. 061-003-00635-3, \$15.00.

Residential Energy Consumption Survey: Consumption and Expenditures, April 1984 Through March 1985, Part 1: National Data; March 1987, DOE/EIA-0321/1(84).

Residential Energy Consumption Survey: Consumption and Expenditures, April 1984 Through March 1985, Part 2: Regional Data; May 1987, DOE/EIA-0321/2(84).

Residential Energy Consumption Survey: Consumption and Expenditures, April 1982 Through March 1983, Part 1: National Data; November 1984, DOE/EIA-0321/1(82), GPO Stock No. 061-003-00411-3, \$7.00.

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Residential Energy Consumption Survey: Consumption and Expenditures, April 1981 Through March 1982, Part 2: Regional Data; October 1983, DOE/EIA-0321/2(81), GPO Stock No. 061-003-00357-5, \$8.00.

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Residential Energy Consumption Survey: Consumption and Expenditures, April 1980 Through March 1981, Part 2: Regional Data; June 1983, DOE/EIA-0321/2(80), GPO Stock No. 061-00300319-2, \$7.00.

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Residential Energy Consumption Survey: 1979-1980 Consumption and Expenditures, Part II: Regional Data; May 1981, DOE/EIA-0262/2, GPO Stock No. 061-003-00189-1, \$8.50.

Residential Energy Consumption Survey: Consumption and Expenditures, April 1978 Through March 1979; July 1980, DOE/EIA-0207/5, GPO Stock No. 061-003-00131-9, \$7.50.

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Other Publications on the Residential Sector

End-Use Consumption of Residential Energy (Article), pp. vii-xiv, Monthly Energy Review, July 1987, DOE/EIA-0035(87/07).

Residential Energy Consumption Survey: Trends in Consumption and Expenditures 1978-1984 June 1987, DOE/EIA-0482, GPO Stock No. 061-003-00535-7, \$12.00.

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Commercial Sector

Characteristics of Buildings

Nonresidential Buildings Energy Consumption Survey: Characteristics of Commercial Buildings, 1986; September 1988, DOE/EIA-0246(86), GPO Stock No. 061-003-00580-2, \$16.00.

Nonresidential Buildings Energy Consumption Survey: Characteristics of Commercial Buildings, 1983; July 1985, DOE/EIA-0246(83), GPO Stock No. 061-003-00439-3, \$7.50.

Nonresidential Buildings Energy Consumption Survey: Characteristics of Commercial Buildings, 1983; A Supplemental Reference, DOE/EIA-M008, \$22.95. Available from the National Technical Information Service (NTIS), Order No. DE-85015581.

Nonresidential Buildings Energy Consumption Survey: Fuel Characteristics and Conservation Practices; June 1981, DOE/EIA-0278, GPO Stock No. 061-003-00200-5, \$9.00.

Nonresidential Buildings Energy Consumption Survey: Building Characteristics; March 1981, DOE/EIA-0246, GPO Stock No. 061-003-00171-8, \$6.50.

Consumption and Expenditures

Nonresidential Buildings Energy Consumption Survey: Commercial Buildings Consumption and Expenditures 1986; May 1989, DOE/EIA-0318(86), GPO Stock No. 061-003-00613-2, \$19.00.

Nonresidential Buildings Energy Consumption Survey: Commercial Buildings, Consumption and Expenditures 1983; September 1986, DOE/EIA-0318(83), GPO Stock No. 061-003-00496-2, \$13.00.

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Industrial Sector

Manufacturing Energy Consumption Survey: Energy Efficiency in Manufacturing, 1985; DOE/EIA-0516(85), GPO Stock No. 061-003-00650-7, \$4.25.

Manufacturing Energy Consumption Survey: Fuel Switching Capability, 1985; December 1988, DOE/EIA-0515(85), GPO Stock No. 061-003-00601-9, \$3.50.

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Industrial Energy Consumption, "Survey of Large Combustors: Report on Alternate Fuel-Burning Capabilities of Large Boilers in 1979"; February 1982, DOE/EIA-0304, GPO Stock No. 061-003-0233-1, \$2.50.

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Cross-Sector

Natural Gas: Use and Expenditures; April 1983, DOE/EIA-0382, GPO Stock No. 061-003-00307-9, \$5.50.

Public Use Tapes

Residential and Residential Transportation Sectors

Residential Energy Consumption Survey: 1987 and Residential Transportation Energy Consumption Survey, 1988; planned for Feb. 1990.

Residential Energy Consumption Survey: 1984 and Residential Transportation Energy Consumption Survey, 1985; Order No. PB87-186540/HAA.

Residential Energy Consumption Survey: 1982 and Residential Transportation Energy Consumption Survey, 1983; Order No. PB85-221760/HAA.

Residential Energy Consumption Survey: Housing Characteristics, 1981; Consumption and Expenditures, 1981-1982; Monthly Billing Data; Order No. PB84-120476/HAA.

Residential Energy Consumption Survey: Consumption and Expenditures, 1980-1981; Monthly Billing Data; Order No. PB84-166230/HAA.

Residential Energy Consumption Survey: Housing Characteristics, Annualized Consumption and Ex-

penditures, 1980-1981; Order No. PB83-199554/HAA.

Residential Energy Consumption Survey: Household Transportation Panel Monthly Gas Purchases and Vehicle and Household Characteristics, 6/79-9/81; Order No. PB84-162452/HAA.

Residential Energy Consumption Survey: Household Screener Survey, 1979-1980; Order No. PB82-114877/HAA.

Residential Energy Consumption Survey: Household Monthly Energy Consumption and Expenditures, 1978-1979; Order No. PB82-114901/HAA.

National Interim Energy Consumption Survey (Residential), 1978; Order No. PB81-108714/HAA.

Commercial Sector

Nonresidential Buildings Energy Consumption Survey: 1986 Data; Order No. PB90-500034, \$210.

Nonresidential Buildings Energy Consumption Survey: 1979 and 1983 Data; Order No. PB88-245162.

Glossary

Aggregate Ratio: See **Mean and Ratio Estimate**.

AMPD: Average miles driven per day. See **Appendix B, "Estimation Methodologies."**

Annual Vehicle Miles Traveled: See **Vehicle Miles Traveled**.

Automobile: Includes standard passenger car, 2-seater car and station wagons; excludes passenger vans, cargo vans, motor homes, pickup trucks, and jeeps or similar vehicles. See **Vehicle**.

Average Household Energy Expenditures: A ratio estimate defined as the total household energy expenditures for all RTECS divided by the total number of households. See **Ratio Estimate, and Combined Household Energy Expenditures**.

Average Number of Vehicles per Household: The average number of vehicles used by a household for personal transportation during 1988. For this report, the average number of vehicles per household is computed as the ratio of the total number of vehicles to the total number of households within any subgroup or "table cell." The total number of vehicles used by a household is based on the number of days each vehicle is used. For example, a total of one vehicle may represent two vehicles, each used for half of the year. See **Vehicle**.

Average Vehicle Fuel Consumption: A ratio estimate defined as total gallons of fuel consumed by all vehicles, divided by: (1) the total number of vehicles for average fuel consumption per vehicle or (2) the total number of households (for average fuel consumption per household). See **Ratio Estimate**.

Average Vehicle Miles Traveled: A ratio estimate defined as total miles traveled by all vehicles, divided by: (1) the total number of vehicles (for average miles traveled per vehicle) or (2) the total number of households (for average miles traveled per household). See **Ratio Estimate and Vehicle Miles Traveled**.

BLS: Bureau of Labor Statistics within the U.S. Department of Labor. See **Price**.

British thermal unit (Btu): The amount of energy required to raise the temperature of 1 pound of water 1 degree Fahrenheit (F) at or near 39.1 degrees F and 1 atmosphere of pressure. One Btu is about equal to the heat given off by a blue-tip match See **Conversion Factor**.

Btu: See British thermal unit.

Btu Conversion Factor: See **Conversion Factor**.

Bureau of Labor Statistics (BLS) Pump Price Series: See **Price**.

Carburetor: A fuel delivery device for producing a proper mixture of gasoline vapor and air, and delivering it to the intake manifold of an internal combustion engine. Gasoline is gravity fed from a reservoir bowl into a throttle bore, where it is allowed to evaporate into the stream of air being inducted by the engine. This fuel efficiency of carburetors is more temperature dependent than fuel injection systems. See **Fuel Injection and Diesel Fuel System**.

Census Division: A geographic area consisting of several States defined by the U.S. Department of Commerce, Bureau of the Census. See the map in **Appendix F, "U.S. Census Regions and Divisions."** The States are grouped into nine divisions and four regions:

Region	Division	States
Northeast	New England	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont
	Middle Atlantic	New Jersey, New York, and Pennsylvania
Midwest	East North Central	Illinois, Indiana, Michigan, Ohio, and Wisconsin
	West North Central	Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota
South	South Atlantic	Delaware, the District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia
	East South Central	Alabama, Kentucky, Mississippi, and Tennessee
	West South Central	Arkansas, Louisiana, Oklahoma, and Texas
West	Mountain	Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming
	Pacific	Alaska, California, Hawaii, Oregon, and Washington

Census Region: See **Census Division** and the map in **Appendix F**, "U.S. Census Regions and Divisions."

Central City: Usually one or more legally incorporated cities within the Metropolitan Statistical Area (MSA) that is significantly large by itself or large relative to the largest city in the MSA. Additional criteria for being classified as "Central City" include having at least 75 jobs for each 100 employed residents and having at least 40 percent of the resident workers employed within the city limits. Every MSA has at least one central city, usually the largest city. Central cities are commonly regarded as relatively large communities with a denser population and a higher concentration of economic activities than the outlying or suburban areas of the MSA. "Outside Central City" are those parts of the MSA not designated as central city. See **Metropolitan**.

Certification Files: See **Environmental Protection Agency Certification Files**.

Change in Vehicle Stock: See **Vehicle Acquisition and Vehicle Disposition**.

CID: Cubic Inch Displacement. See **Engine Size**.

Cold-Deck Imputation: A statistical procedure that replaces a missing value of an item with a constant value from an external source such as a value from a previous survey. See **Imputation** and **Appendix C**, "Quality of the Data."

Combined Household Energy Expenditures: The total amount of funds spent for energy consumed in, or delivered to, a housing unit during a given period of time; and for fuel used to operate the motor vehicles that are owned or used on a regular basis by the household. For this report, expenditures for energy consumed in the housing unit are presented on an annual basis for calendar year 1987 as collected during the 1987 Residential Energy Consumption Survey. All vehicle expenditure statistics calculated for the RTECS are on an annual basis for calendar year 1988.

The total dollar amount for energy consumed in a housing unit includes State and local taxes but excludes merchandise repairs or special service charges. Electricity, and natural gas expenditures are for the amount of those energy sources consumed. Fuel oil, kerosene and LPG expenditures are for the amount of fuel purchased, which may differ from the amount of fuel consumed.

The total dollar amount of fuel spent for vehicles is the product of fuel consumption and price. In the 1988 RTECS, price data were obtained from the Bureau of Labor Statistics price data and the Lundberg Survey Inc. price series. See **Vehicle Fuel Expenditures**, **Average Household Energy Expenditures** and **Price**.

Conversion Factor: A number that translates units of one system into corresponding values of another system. Conversion factors are used to translate physical units of measures for various fuels into Btu equivalents. Conversion factors used in this report are:

Motor Gasoline .....	.125 million Btu per gallon
Diesel Fuel .....	.139 million Btu per gallon
Propane .....	.091 million Btu per gallon
Gasohol .....	.121 million Btu per gallon
Gasohol = 90 percent motor gasoline and 10 percent ethanol	
1 barrel = 42 gallons	

Diesel Fuel: A fuel composed of distillates obtained in petroleum refining operation or blends of such distillates with residual oil used in motor vehicles. The boiling point and specific gravity are higher for diesel fuels than for gasoline. See **Diesel Fuel System**.

Diesel Fuel System: Diesel engines are internal combustion engines that burn diesel oil rather than gasoline. Injectors are used to spray droplets of diesel oil into the combustion chambers, at or near the top of the compression stroke. Ignition follows due to the very high temperature of the compressed in-take air, or to the use of "glow plugs," which retain heat from previous ignitions (spark plugs are not used). Diesel engines are generally more fuel efficient than gasoline engines, but must be stronger and heavier due to high compression ratios. See **Diesel Fuel**, **Carburetor**, and **Fuel Injection**.

Drivers: Household members who drove a vehicle on a regular basis at the time of the 1987 RECS personal interviews.

Electricity: See **Main Heating Fuel**.

Energy Used in the Home: For electricity or natural gas, the quantity is the amount used by the household during the 365- or 366-day period. For fuel oil, kerosene, and liquefied petroleum gas (LPG), the quantity consists of fuel purchased, not fuel consumed. If the level of fuel in the storage tank was the same at the beginning and end of the annual period, then the quantity consumed would be the same as the quantity purchased. Information on

the level of fuel in the storage tank was not included in the data collection. The time period for household consumption for energy used in the home is January 1987 through December 1987 and was collected during the 1987 Residential Energy Consumption Survey.

Engine Size: The total volume within all cylinders of an engine, when pistons are at their lowest positions. The engine is usually measured in "Liters" or "cubic inches of displacement (CID)." Generally, larger engines result in greater engine power, but less fuel efficiency. There are 61.024 cubic inches in a liter. See **Number of Cylinders**.

Environmental Protection Agency (EPA) Certification Files: Computer files produced by EPA for analysis purposes. For each vehicle make, model and year, the files contain the EPA test MPG's (city, highway and 55/45 composite). These MPG's are associated with various combinations of engine and drive-train technologies (e.g., number of cylinders, engine size, gasoline or diesel fuel, and automatic or manual transmission). These files also contain information similar to that in the DOE/EPA *Gas Mileage Guide*, although the MPG's in that publication are adjusted for shortfall. See **Miles per Gallon, Shortfall** and **Appendix B, "Estimation Methodologies."**

EPA Certification Files: See **Environmental Protection Agency (EPA) Certification Files**.

EPA Composite MPG: The harmonic mean of the EPA city and highway MPG, weighted under the assumption of 55 percent city driving and 45 percent highway driving. See **Appendix B, "Estimation Methodologies."**

Family Income: The total combined annual income in 1987 of all members of the family from all sources before taxes and deductions as collected in the 1987 RECS. It includes wages, salaries, tips, commissions, income from Social Security, pensions, interest, dividends, rent, public assistance, and unemployment insurance. This includes the total income for all family members who lived in the household in 1987. Income of nonfamily members of the household is not included. "Family" includes the following types of relationships: mother, father, sister, brother, son, daughter, father-in-law, uncle, aunt, niece, grandchild, foster child, and similar relationships.

Four-Wheel Drive: See **Type of Drive**.

Front-Wheel Drive: See **Type of Drive**.

Fuel Consumption: See **Vehicle Fuel Consumption**.

Fuel Efficiency: See **Miles per Gallon**.

Fuel Expenditures: See **Vehicle Fuel Expenditures**.

Fuel Injection: A fuel delivery system whereby gasoline is pumped to one or more fuel injectors under high pressure. The fuel injectors are valves that, at the appropriate times, open to allow fuel to be sprayed or atomized into a throttle bore or into the intake manifold ports. The fuel injectors are usually solenoid operated valves under the control of the vehicle's on-board computer (thus the term "electronic fuel injection"). The fuel efficiency of fuel injection systems is less temperature dependent than carburetor systems. Diesel engines always use injectors. See **Carburetor**, and **Diesel Fuel Systems**.

Fuel Oil: See **Main Heating Fuel**.

Fuel Type: See **Type of Vehicle Fuel Purchased**.

Full Service: See **Type of Primary Service**.

GPMPR (Gallons per Mile Ratio): See **MPG Shortfall** and **Appendix B, "Estimation Methodologies."**

Gasohol: A fuel used in motor vehicles that is a blend of finished motor gasoline (leaded or unleaded) and alcohol (generally ethanol, but sometimes methanol), limited to 10 percent alcohol by volume. See **Gasoline**.

Gasoline: A complex mixture of relatively volatile hydrocarbons, with or without small quantities of additives, obtained by blending appropriate refinery streams to form a fuel suitable for use in spark ignition engines. Motor gasoline includes both leaded or unleaded grades of finished motor gasoline, blending components, and gasohol.

High-Mileage Households: Households with estimated aggregate annual vehicle mileage that exceeds 12,500 miles, as obtained in the 1987 RECS.

Hispanic Descent: This, as the question on origin, was self-determined by the respondent and is collected in the 1987 RECS. The respondent was asked, "Is the householder of Spanish or Hispanic descent?" and the respondents' answer was recorded. See **Origin**.

Hot-Deck Imputation: A statistical procedure for deriving a probable response to a questionnaire item concerning a household or vehicle, where no response was given during the survey. To perform the procedure, the households or vehicles are sorted by variables related to the missing item. Thus, a series of "sort categories" are formed, which are internally homogeneous with respect to the sort variables. Within each category, households or vehicles for which the questionnaire item is not missing are randomly selected to serve as "donors" to supply values for the missing item of "recipient" households or vehicles. See **Imputation** and **Appendix C, "Quality of the Data."**

Household: A family, an individual, or a group of up to nine unrelated persons occupying the same housing unit at the time of the 1987 RECS interview. "Occupy" means the housing unit was the person's usual or permanent place of residence at the time of the first field contact. The household includes babies, lodgers, boarders, employed persons who live in the housing unit, and persons who usually live in the household but are away traveling or in a hospital. The household does not include persons who are normally members of the household but who were away from home as college students or members of the armed forces at the time of the contact. The household does not include persons temporarily visiting with the household if they have a place of residence elsewhere, persons who take their meals with the household but usually lodge or sleep elsewhere, domestic employees or other persons employed by the household who do not sleep in the same housing unit, or persons who are former members of the household, but have since become inmates of correction or penal institutions, mental institutions, homes for the aged or needy, homes or hospitals for the chronically ill or handicapped, nursing homes, convents or monasteries, or other places in which residents may remain for long periods of time. By definition, the number of households is the same as the number of occupied housing units. The number of households for a subgroup or table cell is estimated by summing the survey weights over all sample households in that subgroup.

Householder: The person (or one of the people) in whose name the home is owned or rented. If there is no lease or similar agreement, or if the person who owns the home or pays the rent does not live in the housing unit, the householder is the person responsible for paying the household bills, or whoever is generally in charge.

Household Composition: The configuration of the household members including number of children, number of household members, and age of household members. For this report, households were divided into households with children and households without children. Within the households with children, a further division was made depending on the age of the oldest child. Within households without children, a further division was made depending on the number of adults and then within that category, the age of the households. See **Household, Householder, and Housing Unit**.

Household Energy Expenditures: The total amount of funds spent for energy consumed in, or delivered to, a housing unit during a given period of time. See **Combined Household Energy Expenditures**.

Household Size: Number of individuals occupying a housing unit. See **Household, and Housing Unit**.

Housing Unit: A structure or part of a structure where a household lives. It has direct access from the outside of the building, either directly or through a common hall. Housing units do not include group quarters such as prisons or nursing homes where 10 or more unrelated persons live. Hotel and motel rooms are considered housing units if occupied as the usual or permanent place of residence.

Imputation: A group of statistical techniques for estimating probable responses to questionnaire items concerning households or vehicles, where no responses or poor quality responses were given during the survey. The three most common techniques employed in this survey were "hot-deck," "regression," and "predictive mean matching." See **Hot-Deck Imputation, Cold-Deck Imputation, Predictive Mean Matching, Regression Imputation, and Appendix C, "Quality of the Data."**

Intermediate Grade Gasoline: An increasingly common grade of unleaded gasoline with an octane rating intermediate between "regular" and "premium." Octane boosters are added to gasolines to control engine pre-ignition or "knocking" by slowing combustion rates. See **Regular Grade Gasoline** and **Premium Grade Gasoline**.

In-Use MPG: An MPG that was adjusted for seasonality and annual miles traveled. See **Appendix B, "Estimation Methodologies."**

Jeep-like Vehicle: Includes light trucks that are similar to jeeps. Other common terms for these vehicles are special purpose, utility or off-the-road vehicles. They may have a four- or two-wheel drive. See **Vehicle**.

Kerosene: See **Main Heating Fuel**.

Large Van: See **Van**.

Leaded Gasoline: A fuel that contains more than 0.05 gram of lead per gallon or more than 0.005 gram of phosphorus per gallon. See **Gasoline** and **Unleaded Gasoline**.

Liquefied Petroleum Gas (LPG): See **Main Heating Fuel**.

Liters: See **Engine Size**.

Lundberg Survey Inc. Price Series: See **Price**.

Main Heating Fuel: The primary fuel delivered to a residential site. It may be converted to some other form of energy at the site. The following are defined as primary fuels for this report:

Electricity: metered electric power supplied by a central utility company to a residence via underground or above-ground power lines. It does not refer to electricity generated onsite for the exclusive use of a residence. When a residence has its own generating capability, the fuel used for the generator will be specified. The Btu equivalent for electricity is the energy value of electricity as received by the household (3,412 Btu per kilowatthour). For this report, energy losses that occur in generating and transmitting electricity are not included in the conversion of electricity into a Btu equivalent. If these losses were to be included, the conversion rate would generally be about 10,353 Btu per kilowatthour.

Fuel Oil: No. 1, No. 2, or No. 4 grade fuel oil or residual oil that is burned for space- or water-heating purposes. No. 1 distillate fuel oil is a form of heating oil used mostly as a blending stock to insure that heavier grades of fuel flow under severe cold weather conditions. No. 2 distillate refers to both No. 2 heating oil and No. 2 diesel fuel. Although these products are not identical, they are essentially interchangeable for most applications. No. 2 fuel oil is the most common form of heating oil. No. 4 distillate is a blend of No. 2 and No. 5 or No. 6 residual fuel oil, used in large stationary diesel engines and boilers equipped with fuel preheating equipment. Residual fuel oil refers to the heavier oils that remain after the distillate fuel oils and lighter hydrocarbons are boiled off in refinery operations.

Kerosene: The generic name for a distilled product of oil or coal, having properties similar to those of No. 1 fuel oil. Kerosene is used for cooking stoves, for space heating

or water heating, or for lighting equipment that uses wicks. It is sometimes sold under the names "range oil," "stove oil," or "coal oil."

LPG or Liquefied Petroleum Gas: any fuel gas supplied to a residence in liquid form, such as propane or butane. It is usually delivered by tank truck and stored near the residence in a tank or cylinder until used. Propane was the most common liquefied petroleum gas supplied to RECS households. Household use of LPG solely for outdoor gas grills is not considered sufficient use to mark the household as a user of LPG.

Natural Gas: Utility gas supplied by underground pipeline to individual housing units by a central utility company. It does not refer to privately owned gas wells operated by the household, nor to LPG.

Mean: The simple arithmetic average for a population; that is, the sum of all the values in a population divided by the size of the population. For this report, population means are estimated by computing the weighted sum of the sample values, then dividing by the sum of the sample weights. The mean is, thus, an aggregate ratio whose denominator is the total number of households or vehicles. See **Ratio Estimate**.

Measured Heated Area of Residence: The floor area of the housing unit that is enclosed from the weather and heated as collected in the 1987 RECS. Basements are included whether or not they contain finished space. Garages are included if they have a wall in common with the house. Attics that have finished space and attics that have some heated space are included. Crawl spaces are not included even if they are enclosed from the weather. Sheds and other buildings that are not attached to the house are not included. "Measured" area means that the measurement of the dimensions of the home did not rely on the respondent's reports but was an actual measurement by the interviewer using a metallic, retractable, 50-foot tape measure. "Heated area" is that portion of the measured area that is heated during most of the season. Rooms that are shut off during the heating season to save on fuel are not counted. Attached garages that are unheated and unheated areas in the attics and basements are also not counted.

Metropolitan: A group of households located within Metropolitan Statistical Areas (MSA's) as defined by the U.S. Office of Management and Budget. Except in New England, an MSA is (1) a county or group of contiguous counties that contain at least one city of 50,000 inhabitants or more, or (2) an urbanized area of at least 50,000 inhabitants and a total MSA population of at least 100,000 (75,000 in New England). The contiguous counties are included in an MSA if, according to certain criteria, they are essentially metropolitan in character and are socially and economically integrated with the central city. In New England, MSA's consist of towns and cities, rather than counties. See **Nonmetropolitan** and **Central City**.

Metropolitan Status: Refers to the geographic location of the households in relationship to MSA's. See **Metropolitan**, **Nonmetropolitan**, and **Central City**.

Miles per Gallon (MPG): A measure of vehicle fuel efficiency. Miles per gallon or MPG as presented in this report represents "Fleet Miles per Gallon." For each subgroup or "table cell," MPG is computed as the ratio of the total number of miles traveled by all vehicles in the subgroup to the total number of gallons consumed. For the 1988 RTECS, MPG's were assigned to each vehicle using the EPA certification files and adjusted for on-road driving. See **Appendix B**, "Estimation Methodologies" for a discussion of how MPG's were assigned to each vehicle.

Mini-Service Pumps: See **Type of Primary Service**.

Mini Van: See **Van**.

Model Year: The year in which the particular style or design of vehicle was introduced or manufactured.

Motor Fuel Consumption: See **Vehicle Fuel Consumption**.

Motor Fuel Expenditures: See **Vehicle Fuel Expenditures**.

MPG: See **Miles per Gallon**.

MPG Shortfall: The difference between actual on-road MPG and EPA laboratory test MPG. MPG shortfall is expressed as gallons per mile ratio (GPMR). See **Appendix B**, "Estimation Methodology."

MSA: See **Metropolitan**.

Multistage Area Probability Sample: A sample design executed in stages with geographic "clusters" of sampling units selected at each stage. This procedure reduces survey expense while maintaining national coverage. See **Appendix A**, "How the Survey Was Conducted."

Natural Gas: See **Main Heating Fuel**.

Nonmetropolitan: Households not located within MSA's as defined by the U.S. Office of Management and Budget. See **Metropolitan**.

Number of Cylinders: In a reciprocating engine, a cylinder is the chamber in which combustion of fuel occurs and the piston moves, ultimately delivering power to the wheels. Common engine configurations include 4, 6, and 8 cylinders. Generally, the more cylinders a vehicle has, the greater the amount of engine power it has. However, more cylinders often result in less fuel efficiency. See **Engine Size**.

Number of Households: The total number of households in the United States that are represented by the sample households. In this report, most statistics are shown for the number of households with vehicles, which is a subset of the total number of households.

Number of Vehicles: See **Vehicle and Vehicle Stock**.

Occupied Housing Unit: A unit someone was living in as his or her usual or permanent place of residence when the first field contact was made. See **Housing Unit**.

On-road MPG: A composite MPG that was adjusted to account for the difference between the test value and the fuel efficiency actually obtained on the road. See **Appendix B**, "Estimation Methodology."

Origin: The primary ethnic background of the person considered to be the householder as self-determined by the respondent. Origin of householder was collected in the 1987 RECS. Each respondent was asked, "Which of the groups on this exhibit best describes the householder?" The groups included: white, black or Negro, American Indian, Alaskan native, Asian, and Pacific Islander. The word "race" was not used in either the questionnaire or the instructions. See **Hispanic Descent**.

Outside Central City: See **Central City**.

Passenger Car: See **Vehicle and Automobile**.

Pickup Truck: Includes compact and full-size pickup trucks. See **Vehicle**.

Poverty: Low-income classifications to which certain households are assigned based on the household's annual income reported in the 1987 RECS. "Below 100 percent of poverty" encompasses a group of households with incomes below the poverty level as defined by the Bureau of the Census. "Below 125 percent of poverty" includes a group of households with incomes below 125 percent of the poverty level. These groups of the poor and near-poor represent alternative levels for defining poverty. The definitions of "poor" are based on the number of family members in the household and the income of the entire family.

Premium Grade Gasoline: A grade of unleaded gasoline with a high octane rating, (approximately 92) designed to minimize preignition or engine "knocking" by slowing combustion rates. See **Regular Grade Gasoline** and **Intermediate Grade Gasoline**.

Predictive Mean Matching: A model-based procedure used to impute for item nonresponse. This method uses logistic models to compute predicted means that are used to statistically match each nonrespondent to a respondent with the closest predicted mean. The respondent's value is directly imputed to the nonrespondent. See **Imputation** and **Appendix C, "Quality of the Data."**

Price: The dollar amount per gallon of fuel purchased. For the 1988 RTECS, fuel prices were not collected directly from the respondent. Instead fuel prices were estimated from the Bureau of Labor Statistics Retail Pump Price Survey and from the Lundberg Survey Inc. Prices. See **Appendix B, "Estimation Methodologies"** and **Appendix C, "Quality of the Data."**

Primary Sampling Unit (PSU): A sampling unit selected at the first stage in multistage area probability sampling. A PSU typically consists of one to several contiguous counties--for example, a metropolitan area with surrounding suburban counties. The approximately 3,100 counties and independent cities of the contiguous United States were grouped into about 1,800 PSU's by a procedure similar to the one used by the Census Bureau for its Current Population Survey. PSU's can be composed of one or more MSA's or can be composed of rural counties. See **Metropolitan** and **Appendix A, "How the Survey Was Conducted."**

PSU: See **Primary Sampling Unit**.

Quadrillion: The number 1,000,000,000,000,000 or 10^{15} .

Ratio Estimate: The ratio of two population aggregates (totals). For example, "average miles traveled per vehicle is the ratio of total miles driven by all vehicles, over the total number of vehicles, within any subgroup or "table cell." In this report, there are two types of ratio estimates: those computed using aggregates for vehicles and those computed using aggregates for households. See **Mean**.

Rear-Wheel Drive: See **Type of Drive**.

RECS: See **Residential Energy Consumption Survey (RECS)**.

Regression Imputation: A statistical technique for predicting the value of a numerical variable that is missing. The technique involves developing a regression equation that predicts the value of the missing variable based upon variables that are not missing or have already been imputed. See **Imputation** and **Appendix C, "Quality of the Data."**

Regular Grade Gasoline: A grade of unleaded gasoline with a lower octane rating (approximately 82) than other grades. Octane boosters are added to gasoline to control engine pre-ignition or "knocking" by slowing combustion rates. See **Intermediate Grade Gasoline** and **Premium Grade Gasoline**.

Relative Standard Error: See **RSE (Relative Standard Error)**.

Residential: Occupied housing units, including mobile homes, single-family housing units (attached and detached), and apartments. The definition of "occupied housing units" is the same as that used by the U.S. Bureau of the Census. See **Household and Housing Unit**.

Residential Energy Consumption Survey (RECS): A national multistage probability sample survey conducted by the Energy End Use Division of the Energy Information Administration. The RECS provides baseline information on how households in the United States use energy. The RTECS sample is a subset of the RECS. Household demographic characteristics reported in the RTECS publication are collected during the RECS personal interview. See **Appendix A, "How the Survey Was Conducted."**

RSE (Relative Standard Error): A measure of the reliability or precision of a survey statistic. Variability occurs in survey statistics because the different samples that could be drawn would each produce different values for the survey statistics. The RSE, is a measure of precision on a percentage scale. The RSE is defined as the standard error of a survey estimate, divided by the survey estimate and multiplied by 100. (Standard error is the square root of the variance.) For example, an RSE of 50 percent means that the standard error is half as large as the survey estimate. See **Appendix C, "Quality of the Data,"** for a discussion of sampling errors.

RSE Column Factor: An adjustment factor that appears above each column of the tables and is used to compute RSE's. For a survey estimate in a particular row and column of a table (that is, a particular "cell"), the approximate RSE is obtained by multiplying the RSE row factor by the RSE column factor for that cell. See **RSE, RSE Row Factor, and Appendix C, "Quality of the Data."**

RSE Row Factor: A factor that appears to the right of each row of the tables, and is used to compute RSE's. For a survey estimate in a particular row and column of a table (that is, a particular "cell"), the approximate RSE is obtained by multiplying the RSE row factor by the RSE column factor for that particular cell. The row factor is equal to the geometric mean of the RSE's in a particular row of the tables. See **RSE, RSE Column Factor and Appendix C, "Quality of the Data."**

Sampling: The procedure used to select housing units for interview from the population of residential housing units in the United States. See **Multistage Area Probability Sample and Appendix A, "How the Survey Was Conducted."**

Self-Service or Mini-Service: See **Type of Primary Service.**

Shortfall: See **MPG Shortfall and Appendix B, "Estimation Methodologies."**

Transmission Type: The householder was asked if each vehicle had an automatic or manual shift transmission. The transmission is the part of a vehicle that transmits motive force from the engine to the wheels, usually by means of gears for different speeds using either a hydraulic "torque-converter" (automatic) or clutch assembly (manual). On front wheel drive cars, the transmission is often called a "transaxle". Fuel efficiency is usually higher with manual, rather than automatic transmissions, although modern, computer-controlled automatic transmissions can be efficient.

Transportation Energy Expenditures: See **Vehicle Fuel Expenditures and Combined Household Energy Expenditures.**

Type of Drive: Refers to which wheels the engine power is delivered to, the so-called "drive wheels." Rear-wheel drive, has drive wheels on the rear of the vehicle. Front-wheel drive, a newer technology, has drive wheels on the front of the vehicle. Four-wheel drive uses all four wheels as drive wheels, and is found mostly on Jeep-like vehicles and trucks, though it is becoming increasingly more common on station wagons and vans.

Type of Fuel System: See **Carburetor, Fuel Injection and Diesel Fuel Systems.**

Type of Vehicle Fuel Purchased: The predominant type of fuel purchased during 1988. Data categories are leaded and unleaded gasoline, diesel motor fuel and "other" which includes propane, and gasohol. See **Gasoline, Gasohol, Unleaded Gasoline, Leaded Gasoline, Regular Grade Gasoline, Intermediate Grade Gasoline, and Premium Grade Gasoline.**

Type of Primary Service: The dominant type of service the respondent uses at the service station. Response categories include Full-Service Pumps, "Self- or Mini-Service Pumps" or "Both Equally." Mini Service is when attendants pump the vehicle fuel but do not provide any other service, such as checking the tire pressure or washing windshields.

Unleaded Gasoline: Contains not more than 0.05 gram of lead per gallon and not more than 0.005 gram of phosphorus per gallon. Premium, regular and intermediate grades are included, depending on the octane rating.

See Gasoline, Leaded Gasoline, Regular Grade Gasoline, Intermediate Grade Gasoline, and Premium Grade Gasoline.

Van: Includes large vans and mini vans. Generally, the distinction between large vans and mini vans is made by the respondents' answers to "Type of Vehicle" question. Exceptions were: (1) Volkswagen vans were categorized as mini vans, and (2) all other pre-1983 vans were categorized as vans.

Vehicle: For the RTECS, vehicles were any motorized vehicles used by U.S. households for personal transportation. Excluded were: motorcycles, mopeds, large trucks, and buses. Included were: automobiles, station wagons, passenger vans, cargo vans, motor homes, pickup trucks, and jeeps or similar vehicles. In order to be included, vehicles must be: (1) owned by members of the household; (2) company cars not owned by household members but regularly available to household members for their personal use and are ordinarily kept at home; or (3) rented or leased for 1 month or more. See **Vehicle Stock, Vehicles Used on the Job, Automobile, Vans, Pickup Trucks, and Jeep-like Vehicles.**

Vehicle Acquisition: The number of vehicles a household acquires or obtains during the RTECS survey year. The average number of vehicles in the stock is computed using these data. See **Vehicle Disposition.**

Vehicle Disposition: The number of vehicles a household disposes of during the RTECS survey year. Disposed vehicles include those sold, traded or the owner moved out of the household. The average number of vehicles in the stock is computed using these data. See **Vehicle Acquisition.**

Vehicle Fuel Consumption: Vehicle fuel consumption is computed as the vehicle miles traveled divided by the fuel efficiency reported in MPG's. For the 1988 RTECS, vehicle fuel consumption was derived from the actual vehicle mileage collected in the RTECS and the assigned MPG's obtained from the EPA certification files and adjusted for on-road driving. The quantity of fuel used by vehicles during a 366-day period (1988 was a leap year). See **Appendix B, "Estimation Methodologies"** for an explanation of procedures used to estimate annual vehicle fuel consumption.

Vehicle Fuel Efficiencies: See **Miles per Gallon (MPG)** and **Appendix B, "Estimation Methodologies."**

Vehicle Fuel Expenditures: The cost, including taxes, of the gasoline, gasohol or diesel fuel added to the vehicle's tank. Expenditures do not include the cost of oil or other items that may have been purchased at the same time as the vehicle fuel. See **Appendix B, "Estimation Methodologies"** for an explanation of procedures used to estimate annual vehicle fuel expenditures.

Vehicle Identification Number (VIN): A set of codes, usually alpha-numeric characters, assigned to a vehicle at the factory and inscribed on the vehicle. When decoded, the VIN provides vehicle characteristics. The VIN was used in the 1988 RTECS to help match vehicles to the EPA certification file for calculating MPG's. See **Environmental Protection Agency Certification Files** and **Appendix A, "How the Survey Was Conducted"**.

Vehicle Miles Traveled (VMT): The number of miles traveled nationally by the RTECS vehicles for a period of 1 year. In the RTECS, VMT were either calculated using 2 odometer readings or, for vehicles with less than 2 odometer readings, imputed using a regression estimate. See **Average Vehicle Miles Traveled, Appendix A, "How the Survey Was Conducted", and Appendix C, "Quality of the Data."**

Vehicle Stock: The number of vehicles owned or used by a household for personal transportation. In the RTECS, with the exception of the statistics reported as of July 1988, a vehicle was defined in terms of a "Vehicle Year." If a vehicle was present in a household for the entire year, it was counted as 1 vehicle. If a vehicle was present in a household for one-half of the year, it was counted as only one-half of a vehicle. Therefore, the number of vehicles a sample household was considered as having during the survey year was computed as the days of possession summed over all vehicles in the household, divided by 366 days (1988 was a leap year). See **Average Number of Vehicles and Vehicles.**

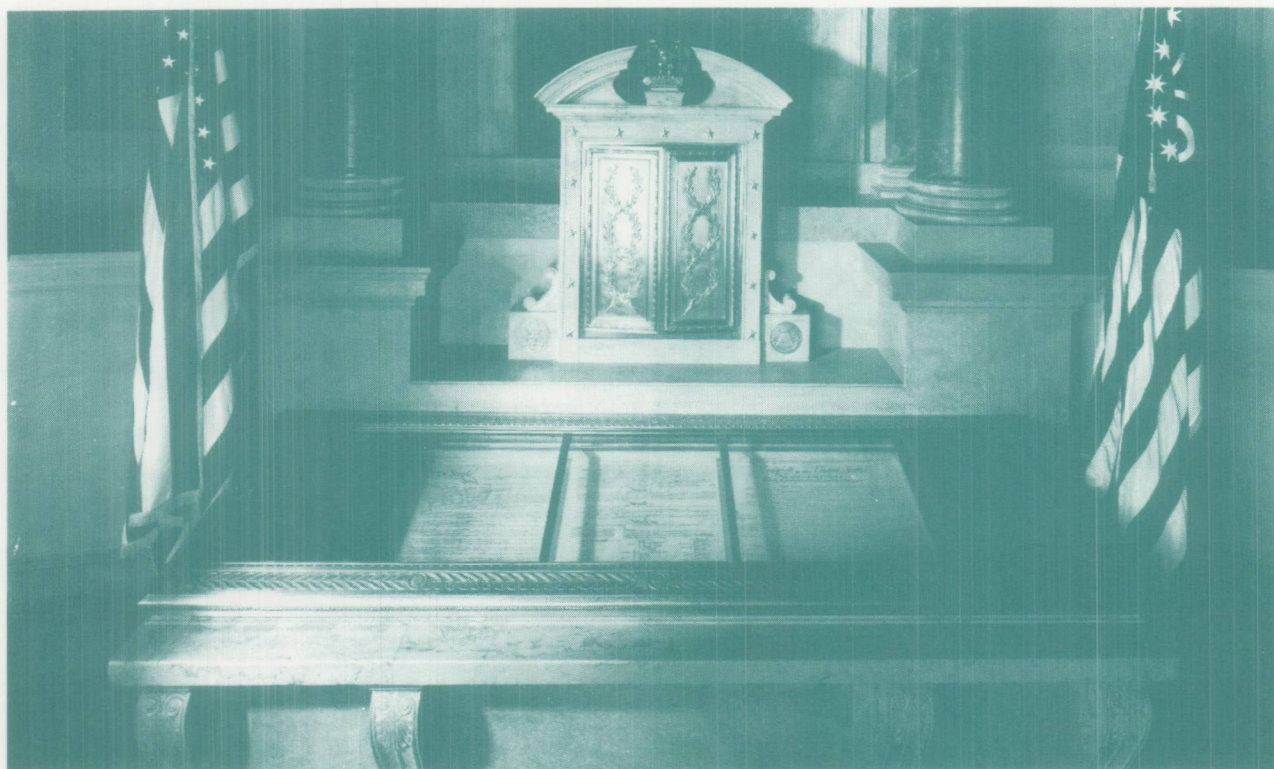
Vehicle Used on the Job: A vehicle used by anyone in the household for job-related activities, excluding commuting to and from work. These vehicles are included in the RTECS. See **Vehicle**.

VIN: See **Vehicle Identification Number**.

VMT: See **Vehicle Miles Traveled**.

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